Agricultural Stations
C. P. and Berar,
report,
1910-11; 1912-13 & 1913-14

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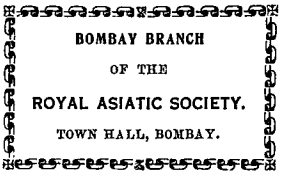

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REPORT

ON THE

AGRICULTURAL STATIONS

IN THE

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CENTRAL PROVINCES AND BERAR

FOR

THE YEAR 1910-11, 1912-13, 1913

Ending the 30th June 1911.

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REPORT ON THE AGRICULTURAL STATIONS IN THE CENTRAL PROVINCES AND BERAR FOR THE YEAR 1910-11.

POWARKHERA FARM.

HISTORY.

This station was established in 1903, but owing to the unsuitability of part of the land originally acquired for experimental purposes, the area was extended in 1906, so as to include a piece of level black soil. The Cattle-breeding Farm adjoins the Experimental Farm proper, and both are under the same management. The total area now consists of 486·57 acres, *viz.*:—

		Acres.
Arable land	...	248·09
Grazing area	...	177·60
Grass *bir*	...	53·59
Roads and buildings	...	7·29
Total	...	486·57

The area available for grazing is scarcely large enough for the herd, which averages about 110 head in number in addition to the plough cattle, and, in order to avoid the dangers which tend to arise from overcrowding, steps are being taken to acquire a further thirty-four acres of fallow land which adjoins the Farm boundary.

GENERAL IMPROVEMENTS.

The embankments constructed to stop erosion continue to act successfully. Some of the fields have levelled up so rapidly that their value must have been enhanced by about 30 per cent. Heavy showers in September caused one or two "bursts," but little damage was done.

The arable land is now practically free from *kans*, and, where patches of this weed do occur, deep ploughing in the hot weather provides an effective method of eradication.

The quality of the pastures is rapidly improving, and the system of surface drainage introduced two years ago seems to be having beneficial effects in encouraging the superior grasses. The hay crop was so good that there was no necessity, this year, to buy grass in order to keep up the reserve stock.

CHARACTER OF THE SEASON.

The rainfall was 51·71 inches, which is nearly fifteen inches more than the average for the last six years. The monsoon was very abnormal. In the first half the rainfall was uncertain and below the average, but afterwards heavy rain fell in August, and the rains continued far longer than usual, returns of the monsoon in October and November being accompanied by heavy rain. The late departure of the monsoon generally means a good *rabi* harvest, but that crop this year was disappointing. Owing to continuous rain in the latter part of the monsoon *rabi* land did not get the intercultivation which is so essential to the production of a good wheat crop. It was noticed that wheat sown after the heavy storms of November gave a most disappointing crop, and as few cultivators had sown before that time, the wheat crop of the district as a whole was most disappointing.

Cotton was one of the worst crops on record. Germination was patchy, owing to the uncertain nature of the early rains, and late showers entirely destroyed the first two pickings.

There has been a tendency in this district to put much wheat land under cotton, cultivators being tempted to do so no doubt, by the very high prices of the latter. A season like last year acts as a wholesome corrective to this doubtful practice, as on account of late and continuous rain much of the cotton sown on the heavier soils damped off owing to water-logging.

The following table compares the rainfall with the average of last six years :—

Month.	Number of rainy days.	Rainfall during 1910-11.	Average rainfall of last six years.
June 1910 ... 1st half	5	0·99	0·47
" ... 2nd "	11	5·09	4·15
July " ... 1st "	6	8·18	6·51
" ... 2nd "	5	3·03	7·46
August " ... 1st "	14	22·62	5·66
" ... 2nd "	9	2·10	6·06
September " ... 1st "	11	9·20	4·02
" ... 2nd "	11	7·27	1·44
October " ... 1st "	5	1·18	...
" ... 2nd "	...	...	...
November " ... 1st "	5	1·44	...
" ... 2nd "	...	...	0·05
December " ... 1st "	...	...	·12
" ... 2nd "	...	...	0·20
January 1911 ... 1st "	2	·42	0·06
" ... 2nd "	...	...	...
February " ... 1st "	...	...	0·18
" ... 2nd "	...	...	0·09
March " ... 1st "	1	0·19	0·03
" ... 2nd "	...	...	0·18
April " ... 1st "	...	...	0·19
" ... 2nd "	...	...	...
May " ... 1st "	...	...	...
" ... 2nd "	...	...	0·14
Total ...	85	61·71	37·01

N. B.—A rainy day is day on which there has been a fall of more than 0·10 cents.

STAFF.

The farm was under the management of Mr. Nandkishore, who has shown his usual keenness in keeping up the high standard of cultivation of the land. The overseers on the farm, although inexperienced, have also done good work.

The farm office has suffered from unavoidable changes in the post of farm clerk, but now that an avenue of promotion has been opened for clerks occupying this position, it is hoped that a suitable man will be secured, who will stay on permanently and thoroughly master the details of his work.

The farm had the further benefit of the advice of Mr. Cove, the Head Master elect of the School of Handicrafts, who was attached to this circle for three months. His assistance in improving the existing types of winnowers, seed drills and reapers was of great value.

SERIES A.—To test the effect of different manures on wheat grown continuously with irrigation.

Variety of wheat—Jalalia. Area—·10 acre each plot.

No. of plot.	Treatment.	Outturn per acre.				Cost of cultivation per acre.	Value realized per acre.	Profit or loss per acre.
		1909-10.		1910-11.				
		Grain.	Other.	Grain.	Other.			
		lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Unmanured ...	738	1,170	680	945	14 4 4	31 15 3	17 10 9
2	Saltpetre=20 lbs. nitrogen per acre topdressed.	765	1,161	1,000	1,105	29 0 2	45 9 2	16 9 0
3	Ammonium sulphate=20 lbs. nitrogen per acre mixed with seed before sowing.	522	725	555	580	25 15 10	25 0 10	0 15 0
4	Ammonium sulphate=10 lbs. nitrogen per acre, saltpetre=10 lbs. nitrogen per acre mixed with seed before sowing.	707	960	690	880	27 8 10	31 15 8	4 6 10
5	Saltpetre=20 lbs. nitrogen per acre topdressed at two stages.	954	1,207	748	883	29 1 10	34 3 6	5 1 8
6	Oilcake=20 lbs. nitrogen per acre applied in the middle of rain.	593	914	525	587	15 8 4	23 13 8	8 5 4
7	Farmyard manure=20 lbs. nitrogen per acre applied in the beginning of rain.	787	960	633	725	16 5 8	28 13 8	12 8 0
8	Cattle-dung=10 lbs. nitrogen per acre, saltpetre=10 lbs. nitrogen per acre, cattle-dung applied in the beginning of rain and saltpetre topdressed.	951	1,303	680	783	23 14 6	31 1 6	7 3 0
9	Oilcake=10 lbs. nitrogen per acre in the beginning of rains, saltpetre =10 lbs. topdressed.	852	1,105	795	843	23 2 10	35 15 0	12 13 0
10	Greensoiled with *sann*, 10 lbs. seed sown.	596	935	575	665	19 11 10	26 4 0	6 8 2
11	Greensoiled with *tarota*, 100 maunds per acre.	852	1,272	660	753	24 11 10	30 2 6	5 6 8
12	Calcium nitrate=20 lbs. nitrogen per acre.	...	...	1,305	1,385	...	...	...
13	Calcium cyanamide do.	..	...	1,430	1,495	...	...	...
14	Residual manure ...	...	...	1,120	1,250	...	...	...

The biggest yield was obtained from plot II, in which the wheat was lightly topdressed with nitre, a manure which is not easily obtainable in these parts in any quantity.

The effect of continuous manuring with ammonium sulphate has had a certain effect on the condition of the soil. The germination of the wheat is very uneven and the plants at first do extremely badly picking up a little later on. The ripening of plots manured in this way is also very uneven. The effect of manure applied this year compared with that of the residues of the year before, as instanced by plots 7 and 14 is very much in favour of the latter. Green manuring has again given disappointing results on these heavy black soils. The growing and ploughing in of the green manure during the rains makes it almost impossible to obtain a good seed bed by sowing time. *Mahua* oilcake is evidently not suitable as a manure for wheat on this class of soil, until it has remained a year in the soil and has become thoroughly disintegrated.

Caloium cyanamide and calcium nitrate have given promising results.

Plots 12, 13 and 14 are extra plots added last year and manured with farmyard manure the year before.

SERIES C.—Effect of manure on irrigated wheat applied in June, August and October.

Variety of seed—*Jalalia*. Area—1/10 acre each plot.

No. of plot.	Treatment.	Outturn per acre.				Cost of cultivation per acre.	Value realized per acre.	Profit or loss per acre.
		1909-10.		1910-11.				
		Grain.	Other.	Grain.	Other.			
		lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Farmyard manure=40 lbs. nitrogen per acre applied in June.	610	800	537	614	20 6 8	24 5 7	3 14 11
2	Do. do. in August .	715	805	640	660	20 10 0	28 14 6	8 4 6
3	Do. do. in October..	640	890	573	643	20 4 2	26 1 6	5 13 4
4	Unmanured ...	543	773	500	595	14 1 10	22 15 6	8 13 8

Former years' results are again confirmed. Manure applied in the middle of the rains gives better results than if applied at the commencement or end of the monsoon. This result is of no practical value, however, as in the majority of cases cultivators of the heavy black soils of the Northern Districts will be unable to get the manure on to the land in the middle of the rains.

Although the application of manure gives a rather larger crop than unmanured land, the actual profit is greatest from the unmanured plot, and in irrigated wheat similar results are generally observed. It is undoubtedly a fact that wheat responds best to manure the second year after application on these soils, and the most profitable way of disposing of the manure is by applying it to a *kharif* crop such as cotton or juar and cropping the field with wheat in the succeeding years. There is much black soil both in this and other districts where this practice could be successfully put into effect.

This series will now be stopped, as no further practical results are likely to arise from a continuation of the experiment.

SERIES D.—Effect of manure on unirrigated wheat applied in June, August and October.

Variety of seed.—*Jalalia.* Area—·20 acre each plot.

No. of plot.	Treatment.	Outturn. 1909-10. Grain.	Outturn. 1909-10. Other.	Outturn. 1910-11. Grain.	Outturn. 1910-11. Other.	Cost of cultivation per acre.	Value realized per acre.	Profit or loss per acre.
		lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Farm yard manure-40 lbs. nitrogen per acre applied in June.	654	704	720	638	15 7 6	32 0 1	16 8 7
2	Do. do. in August.	695	710	790	748	15 15 10	35 5 5	19 5 7
3	Do. do. in October.	735	770	755	685	15 9 7	33 10 4	18 0 9
4	Unmanured	411	470	500	503	8 12 10	22 8 0	13 11 2

Owing to the abnormally late continuance of the monsoon, the application of manure has given better results than usual. These plots have now been continuously manured for eight years and the cumulative effect of the manure is beginning to show good results. The remarks in the case of series C, however, may be applied in this case also, and if the late monsoon rains are scanty, manured wheat invariably suffers from patchy germination and attacks of white ants, and it is a much sounder practice to grow wheat in the second year after manure has been given. This series will also be discontinued.

SERIES E.—Effect of rotation with wheat as the principal crop.

Area—·20 acre each plot.

No. of plot.	Treatment.	Outturn per acre. 1909-10. Crop.	Grain.	Other.	Outturn per acre. 1910-11. Crop.	Grain.	Other.	Cost of cultivation per acre.	Value realized per acre.
			lbs.	lbs.		lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	Light dressing of farm yard manure-40 lbs. nitrogen per acre every second year when wheat is grown.	Wheat ...	586	781	Wheat ...	850	808	9 4 4	38 0 9
2		Gram ...	930	854	Do. ...	1,045	923	9 9 9	46 6 6
3		Wheat ...	485	788	Gram ...	760	790	7 8 10	30 0 5
4		*Teora* ...	323	738	Wheat ...	990	855	9 7 8	43 14 1
5		Wheat ...	580	838	*Teora* ...	840	1,358	6 4 10	27 12 7
6		Do ...	495	873	Wheat ...	760	870	9 0 7	38 13 4
		Gram ...	1,590		Gram ...	113			
7		*Rabi til* ...	178	...	Wheat ...	865	820	9 4 4	38 11 2
8		Wheat ...	693	888	Linseed.	475	945	7 0 11	50 0 0
9		*Urid* ...	...	...	Wheat ...	775	775	8 15 4	34 13 11
10		Wheat ...	615	845	*Masur* ...	130	408	5 1 8	6 5 3
11		Do. ...	535	850	Wheat ...	650	770	8 14 6	34 13 6
		Linseed.	48		Gram ...	150			

The value of rotation with a *rabi* leguminous crop is emphasized by the excellent outturns of wheat following gram and *teora.* This soil is not very suited to *masur* and results in this case are therefore not so good.

The good results obtained by rotating with *rabi til* are not so easy to explain. Probably the litter of leaves left on the land by the *til* crop after harvest acts as a fertilizing agent to a greater extent than was formerly suspected.

SERIES F.—Effect of tillage to various depths on wheat grown continuously.

Variety—*Jalalia*. Area—.10 acre each plot.

No. of plot.	Treatment.	Outturn per acre.				Cost of cultivation per acre.	Value realized per acre.
		Average of previous 6 years.		1910-11.			
		Grain.	Other.	Grain.	Other.		
		lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	*Bakhared* only	442	626	450	480	7 8 10	20 6 3
2	Ploughed in with country plough in June and *bakhared* only.	481	630	385	455	7 15 11	17 10 6
3	Ploughed with country plough once in June and once in August and *bakhared*.	536	678	562	560	9 6 10	25 3 4
4	Ploughed before rains with a deep iron plough and *bakhared*.	529	685	558	618	8 7 10	25 5 5

Deep ploughing with an English turn-wrest plough and two ploughings in the rains with the country plough have given the biggest outturns. Plot No. 2 suffered somewhat from white ants, hence the small outturn.

The size of the plots is too small to give relative data with regard to the actual cost of cultivation. This will be considerably modified next year, and ⅛ acre plots will be substituted for the trial of any improved ploughs which are likely to meet the wants of the cultivator.

SERIES H.—Effect on wheat grown continuously of different quantities of seed and different methods of sowing.

Variety of seed—*Jalalia*. Area—.10 acre each plot.

No. of plot.	Treatment.		Outturn per acre.				Cost of cultivation per acre.	Value realized per acre.
			1909-10.		1910-11.			
			Grain.	Other.	Grain.	Other.		
			lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
	60 lbs. seed per acre		250	320	...	...	...	...
1	80 „ do. ...	Sown with country plough.	423	508	650	685	14 10 2	29 6 9
2	100 „ do. ...		560	605	690	668	15 8 7	30 14 11
	120 „ do. ...		453	568	...	...	...	...
	60 „ do. ...		419	482	...	...	...	...
3	80 „ do. ..	Sown with tiffan.	438	518	651	665	14 10 7	29 7 4
4	100 „ do. ...		560	690	660	665	15 7 4	29 11 7
	120 „ do. ...		466	534	...	...	...	...

The area for each plot has been doubled during the year under report. Even now, however, they are hardly large enough to give reliable figures with regard to the comparative costs of cultivation in this class of soil, where a heavy

tifan is required. This year's results confirm those of previous years, *viz.*, that a seed-rate of about 90 lbs. per acre is the most profitable one on this class of land, as cultivated for wheat by local methods.

SERIES M-*a* AND M-*b*.—Effect of different manures on cotton grown in rotation with *juar*, *tur* and sown with drill and broadcast, manure to be applied only in the year in which cotton in grown. Area—20 acre each plot.

No. of plot.	Treatment.	Crop.	M-*a*.—Sown with the drill.							M-*b*.—Sown broadcast.						
			Average of cotton for preceding 3 years	Crop—*juar* and *tur*, 1909-10.		1910-11.				Average of cotton for preceding 3 years.	Outturn per acre, 1909-10.		Outturn of cotton during 1910-11.	Cost of cultivation per acre.	Value realized per acre.
				Grain.	Other.	Outturn per acre cotton.	Cost of cultivation per acre.	Value realized per acre.			Grain.	Other.			
			lbs.	lbs.	lbs.	l s.	Rs. a. p.	Rs. a. p.		lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	Effect of different manures on cotton, *juar* and *tur*, in rotation sown with drill.	Cotton	413	...	...	143	8 11 2	14 11 10		464	...	...	169	6 1 0	16 11 11
		Juar	...	1,076	5,000	...	...	...		...	1,043	4,225	...	...	...
		Tur	...	179	658	...	...	...		...	248	726	...	...	...
2		Cotton	510	...	...	252	15 14 2	25 8 1		469	...	...	196	15 10 0	19 9 9
		Juar	...	1,306	633	...	...	...		...	1,305	5,325	...	...	...
		Tur	...	176	649	...	...	...		...	201	781	...	...	...
3		Cotton	487	...	...	203	12 11 4	20 2 6		434	...	...	213	12 12 7	21 4 0
		Juar	...	1,325	5,770	...	...	...		...	1,191	4,635	...	...	...
		Tur	...	151	659	...	...	...		...	182	680	...	...	...
4		Cotton	554	...	...	245	23 13 8	24 8 6		495	...	...	188	23 13 8	18 12 0
		Juar	...	1,163	6,140	...	...	...		...	1,005	4,030	...	...	...
		Tur	...	181	609	...	...	...		...	183	680	...	...	...
5		Cotton	571	...	...	233	22 7 2	22 3 10		533	...	...	253	23 1 2	25 3 9
		Juar	...	1,141	5,170	...	...	...		...	1,084	3,830	...	...	...
		Tur	...	218	689	...	...	...		...	223	655	...	...	...
6		Cotton	488	...	...	196	20 12 11	19 9 9		435	...	...	185	21 3 2	18 7 10
		Juar	...	1,311	5,740	...	...	...		...	1,123	4,485	...	...	...
		Tur	...	199	603	...	...	...		...	229	779	...	...	...

Plot No. 1. Unmanured.
2. Farm yard manure=40 lbs. nitrogen per acre applied before sowing.
3. Do. 20 ,, do. do.
4. Nitre=20 lbs. nitrogen per acre topdressed before hoeing.
5. Nitre= 10 lbs. nitrogen, ammonium sulphate=10 lbs. nitrogen per acre, nitre as topdressing and ammonium sulphate with seed.
6. Ammonium sulphate=20 lbs. nitrogen per acre drilled in with seed

SERIES N.—Rotation experiments with *kharif* crops.

Area—20 acre each plot.

No. of plot.	Treatment.	Crop.	Outturn per acre. 1909-10. Grain.	Outturn per acre. 1909-10. Other.	Outturn per acre. 1910-11. Grain.	Outturn per acre. 1910-11. Other.	Cost of cultivation per acre.	Value realized per acre.
			lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	To be manured with farm yard manure=40 lbs. nitrogen per acre every other year excepting in plot No. 4 in which cotton is sown.	Cotton ...	230	...	65	...	...	...
		Tur ...	371	354	540	815	13 3 3	23 13 3
2		Cotton ...	...	...	50·12	...	...	...
		Tur ...	...	...	665	950	13 2 0	27 5 6
		Juar ...	1,431	6,989	...	...	...	...
		Tur ...	...	...	835	1,025	13 2 0	29 7 3
3		Cotton ...	...	...	35	...	...	...
		Juar ...	1,200	8,565	...	...	...	...
		Urid ...	3	6	...	...	...	...
4		Cotton	...	...	93	...	8 3 8	9 3 11
5		*Juar* ...	1,135	6,145	...	...	...	...
		Cotton	...	...	93	...	11 11 6	9 3 11
		Juar ...	1,362	7,308	...	...	...	...
6		Cotton ...	...	...	158	...	12 0 11	15 12 1
		San ...	Failed.	...	...	...	...	...
7		Cotton ...	...	...	95	...	11 11 6	9 8 1
		Wheat ...	300	495	...	...	...	...
8		Cotton ...	...	...	118	...	11 15 3	11 11 11
		Gram ...	620	580	...	...	...	...
9		Cotton ...	4	...	93	...	11 12 9	9 3 11
		Wheat ...	43	638	...	...	...	...
		Gram ...	325					
10		Cotton ...	...	...	148	...	11 14 0	14 8 1
		Tur ...	88	173	...	...	...	...
		Rabi til ...	254	...	...	...	...	...

No definite conclusions can be drawn from this year's results which were nullified by the breaks at sowing time, which caused uneven germination, and by the heavy storms at the beginning of the cold weather which made the plants lose their bolls. It is certain, however, that small quantities of both nitrate of soda and sulphate of ammonia give an increased yield, but owing to their high price they cannot compete with farm yard manure at present.

Owing to the unfavourable seasons results are unreliable. Cotton following a leguminous crop, such as *san* hemp grown for fibre or grain has given the best results.

SERIES S.—To test the quantity of water required for *rabi* in black soil with different methods of irrigation. Wheat in rotation with gram.

Area—·10 acre each plot.

No. of plot.	Treatment.	Outturn per acre.								Cost of cultivation per acre.	Value realized per acre.
		1909-10.				1910-11.					
		Quantity of water.	Crop.	Grain.	Other	Quantity of water.	Crop.	Grain.	Other.		
		Gallons.		lbs.	lbs.	Gallons.		lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	Broad irrigation.	78,940	Gram.	938	867	67,690	Gram.	840	1,030	13 13 8	33 3 8
2	*Kiari* do. ...	55,580	Do.	807	693	61,440	Do.	1,020	1,020	12 9 8	39 1 10
3	Long beds do. ...	61,040	Do.	775	777	63,000	Do.	860	960	12 14 8	33 7 0

The *kiari* system has given the best results and has proved most economical of water. Owing to the additional labour required to construct the *kiaris*, however, it is possible that the long bed system will be the most practical method to introduce into new areas, where the irrigation of wheat has only recently been made possible by the construction of irrigation works, and where the local cultivator in consequence knows nothing about the irrigation of wheat.

SERIES T.—To ascertain what quantity of water is most economical for the irrigation of wheat grown continuously on black soil.

Crop—*Sukerhai Pissi.* Soil—*Morand.* Area—·25 acre each plot.

No. of plot	Treatment.		1910-11.				
	Date of irrigation.	Quantity of water in cubic feet.	Outturn per acre.		Cost of cultivation per acre.	Value realized per acre.	Profit per acre.
			Grain.	Other.			
			lb.	lb.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	No Irrigation ...	*Nil.*	446	434	8 9 0	20 0 0	11 7 0
2	1st December 1910 ...	6,000	711	698	10 0 0	31 15 0	21 15 0
3	1st December 1910 ...	6,000	946	944	11 9 0	42 9 0	31 0 0
	1st January 1911 ...	4,000					
4	1st December 1910 ...	6,000	1,028	1,120	11 7 0	46 11 8	35 4 8
	1st February 1911 ...	4,000					
5	1st December 1910 ...	6,000	1,130	1,230	12 13 0	51 5 8	38 8 8
	1st January 1911 ...	4,000					
	1st February 1911 ...	4,000					
6	1st December 1910 ...	12,000	978	1,114	10 7 0	44 12 0	34 5 5

No. of plot.	Treatment. Date of irrigation.	Quantity of water in cubic feet.	1910-11. Outturn per acre. Grain.	Other.	Cost of cultivation per acre.	Value realized per acre.	Profit per acre.
			lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
7	1st December 1910 ...	12,000	1,160	1,072	11 13 0	51 12 0	39 15 0
	1st January 1911 ...	4,000					
8	1st December 1910 ...	12,000	1,019	949	11 13 0	45 8 0	33 11 0
	1st February 1911 ...	4,000					
9	1st December 1910	12,000	884	826	13 3 0	39 6 8	26 3 8
	1st January 1911 ...	4,000					
	1st February 1911 .	4,000					
10	Irrigated when required ...	*Nil.*	664	616	8 9 0	28 13 4	19 4 4

In spite of favourable winter rains, one heavy irrigation about a month after sowing followed by a lighter irrigation about a month later have given remarkable increases of crop, thereby very closely corroborating last year's results. The application of a third irrigation in the third month gives no further increase, however, and it is probable that two irrigations will pay best on this soil in average years.

As a matter of practice it is found that it is nearly impossible to irrigate a full acre with 4,000 cft., and rather more water will be required on account of the porous nature of this class of black soil.

Irrigation on these plots will continue for several years, to test whether there are any signs of the soil becoming exhausted, or turning alkaline.

A certain amount of rust appeared in the plots which were watered in February, but the yield of grain was not affected.

SERIES O.—Trials with nitrogenous fertilizers. The two new artificial manures, calcium nitrate and calcium cyanamide (nitrolein) were tried on *juar* and cotton. The results are stated below :—

I. Crop—*Juar*. Area—½ acre each plot. Manures applied before sowing.

No. of plot.	Treatment.	Outturn of grain per acre.
		lbs.
1	Unmanured	570
2	Nitrolein-20 lbs. nitrogen per acre ...	778
3	Calcium nitrate-20 lbs. nitrogen per acre ...	840

II. Crop—*Jari* cotton. Area—½ acre each plot. Manures applied before sowing.

No. of plot.	Treatment.	Outturn of seed cotton per acre.
		lbs.
1	Unmanured	144
2	Nitrolein-20 lbs. nitrogen per acre ...	221
3	Calcium nitrate-20 lbs. nitrogen per acre ...	204

These manures have given good increases, but until they come on to the Indian markets in commercial quantities and their cost here can be ascertained, it is impossible to say whether they will give paying results.

HAY MANURIAL EXPERIMENTS.

To investigate the manurial requirements of hay.

Plots—·25 acre each.

No. of plot.	Treatment.	Outturn per acre. 1908-09. Hay.	1908-09. Other.*	1909-10. Hay.	1909-10. Other.*	1910-11. Hay.	1910-11. Other.*
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	No manure ...	2,068	20	2,588	44	2,740	...
2	Superphosphate 250 lbs. ...	2,432	64	3,956	16	3,320	...
3	Basic slag 187½ lbs. ..	2,236	100	3,956	48	2,792	...
4	Superphosphate 166⅔ lbs. ...	2,220	80	4,220	68	3,372	...
5	Superphosphate 166⅔ lbs. .. / Potasium sulphate 25 lbs. ...	2,316	48	4,824	60	3,328	...
6	Ammonium sulphate 25 lbs. ..	2,784	48	4,880	4	3,232	...
7	Sodium nitrate 37½ lbs. ...	2,436	20	4,504	24	3,000	...
8	Superphosphate 41⅔ lbs. ...	2,448	48	4,696	52	2,856	...
9	Superphosphate 41⅔ lbs. ... / Sulphate of Potash 10 lbs. ...	2,160	52	4,888	60	2,908	...
10	Superphosphate 41⅔ lbs. ... / Ammonium sulphate 25 lbs. ...	3,000	48	6,008	28	3,728	...
11	Surperphosphate 41⅔ lbs. ... / Ammonium sulphate 25 lbs. ... / Sulphate of potash 10 lbs. ...	2,652	72	5,820	24	3,984	...
12	¾ ton of farm yard manure ..	1,804	80	3,612	24	2,418	...

* Other consists mainly a coarse leguminous weed (*Sesbania Aculeata*).

Last year's results are confirmed. A combination of ammonium sulphate and superphosphate has given a large crop, but the grass is somewhat coarse. The addition of potash has given an increased crop and one of much superior quality.

Superphosphate by itself has given excellent results in the shape of increased crops. Ammonium sulphate has also done well, but the quality of the hay is rather inferior, the coarser growing varieties meeting with undue encouragement. The continuous application of sodium nitrate is affecting the condition of the soil and the crop this year was patchy and coarse, with a marked absence of the finer and bottom grasses.

CROP VARIETY TESTS.

Juar (Andropogon sorghum).—Ten varieties, including six selections made by the Economic Botanist, were tested. The outturns of the most promising varieties have been as follows :—

		lbs.	
Dor B-1'50	...	680	per acre.
Saoner	...	641	,,
Jagdhan	...	668	,,
Sadagar	...	620	,,

Most of the varieties tried were too loose-headed, and the best of these is Dor B-1-50 which will receive another trial. Of the tight-headed varieties Sadagar is too late for this tract and will not be able to compete with Saoner.

The season on the whole was unfavourable to this crop.

Cotton.—Ten varieties were tried, but, owing to late showers which damaged the seed cotton, and the particularly unfavourable season, little can be judged from the results. An early ripening variety of short staple but with a very white lint has been called Saugor *jari*, and is much liked by cultivators, as it gives two pickings on poor soil, before there is any chance of damage from early frost.

The short stapled high-yielding Rosea *jari* also gave a fair yield, and *buri* again gave promising results, but was cut down by frost in the end of January, other local varieties remaining undamaged. *Cambodia* was most disappointing. All varieties were rather badly affected by the red cotton bug.

Ground Nuts (Arachis hypogea).—Five varieties were tried this year.—

Variety.	Outturn per acre in lbs.	'Ticca' disease.
Small Japanese ...	435	Slight.
Big Japanese ...	615	*Nil.*
Chinese No. 2 ...	835	Slight.
Egyptian ...	685	*Nil.*
Mauritius ...	340	Slight.

Nothing can be judged from these figures, as the crop was entirely ruined by pig, in spite of the greatest vigilance on the part of the farm staff.

The small Japanese is a particular favourite with the pig, as the nuts are all collected round the crown and are easily dug up. Big and small Japanese are the most promising varieties.

On account of the depth at which these nuts are buried, Chinese, Egyptian and Mauritius are expensive to harvest. Big Japanese is especially recommended for light soils, as in black soils the nuts do not reach their full development.

Tur (Cajanus indicus).—A red variety from Saugor gave an outturn which compared favourably with the local late red variety A medium early white-seeded variety of nice appearance which has been named *motia* also gave promising results, and is likely to realize an enhanced price on account of its high quality.

An attempt has been made to raise an early variety with a higher yielding power than the ordinary Nagpur *tur*. The best five of the many raised on this farm received further trial.

B-0-25, a small white seeded variety with a white pod, gave an actual yield of 1,017 lbs. per acre in spite of some damage by pig.

B-0-21, a red coloured variety, with a larger seed and a little later, yielded 1,050 lbs. per acre.

B-0-43, which was sown in lines with cotton and so had a better chance than the above two, which were sown as single crops, yielded 1,500 lbs. per acre, but the seed was rather damaged by insects. The seed is brownish red.

B-0-05 and B-0-16 are two other promising early varieties and all will receive a further trial next year.

Sugarcane.—Thick canes, suitable for supplying the chewing-cane market only, were grown on a small area. A *ponda* cane from Damoh gave good results. Local *ponda* and *pachrang* were badly attacked by *agia* (striga lutea) and part of the crop had to be ploughed up. The soil of this farm is too heavy to be really suitable for cane cultivation

Dhan (Oryza Sativa).—A trial was made of early ripening varieties suitable for double-cropped land without irrigation. *Kardhana*, a local black-seeded variety, was very hardy and early, but is extremely coarse in quality.

Raskadam is later, but is of superior quality.

Four selected types were also obtained from the Economic Botanist. The most promising was *Dagar-Kadam* A-1-II which is very early of moderate quality and tillers well. *Chirola* C-III-27 was also promising. Its quality is superior to the last, but its yielding power moderate.

Chillies.—These were grown as an irrigated crop and paid handsomely.

Velvet beans (Mucima utilis).—These were again grown on a small scale. The seeds and fodder are said to sometimes occasion poisoning in cattle, but this crop may possibly be of use as a green manure.

Soy Beans (*Glycine Soja*).—A small seeded Japanese variety, which had been acclimatized at Nagpur, was grown on about ¼ acre of morand II soil The crop is very hardy and grew splendidly, giving a yield of above 800 lbs beans per acre. The seed was analysed by the Agricultural Chemist and gave a very disappointing oil percentage, *viz*., 10 per cent. This variety is evidently more suited for forage purposes, and some new varieties, which have been obtained from Manchuria this year by the courtesy of Messrs. Ralli Brothers, will be tried this year.

Maghai Til (Sesamum).—The yellow seeded variety known as *Purvi maghai til* was grown on the farm. The season was generally very unfavourable for this crop. Experiments were made in drilling it in lines and results were so far satisfactory that a better crop was obtained than when the local method of broadcasting the seed was adhered to. A saving in the cost of weeding can be effected by sowing in lines and the inter-cultivation also forms a soil mulch and conserves the soil moisture to the benefit of the crop, more especially if the late monsoon showers fail.

Peas.—Acclimatized Khaperkheda and Damoh peas were grown.

The last two are garden varieties and require irrigation. The Damoh variety was partly ruined by frost, but will receive a further trial this year.

Linseed.—White linseed was sown as the farm crop and did excellently. The seed stock is absolutely pure, and on account of the higher price it realizes, this variety is in strong demand for seed purposes. Five selected types were received from the Principal, Agricultural College, Nagpur, and were tested on plots of ½ acre each:—

No.	Variety.	Yield per acre in lbs.
4-11-F-2	White.	384
6-27-F-2	Red	430
1452-F-2	Do.	482
523-F-2	Do.	448
1759-F-2	Do.	428

The red varieties all gave bigger outturns than the white one.

Gram (Cicer arietinum).—Four varieties were tried, *viz.*, local yellow, black, *malida* (large white) and *parbatia* (small white).

A certain amount of damage by 'wilt' and white ants (*ugra*) was noticed and the gram-pod caterpillar (*illi*) also did some damage, owing to cloudy weather at the end of the cold weather. The susceptibility to these pests found in the different varieties is shown below :—

Variety.	Yied per area in lbs.	Damage by 'oogra.'	Damage by 'illi.'
Local ...	417	Badly damaged : more affected than other varieties.	Moderately attacked.
Black ...	360	Slight damage by whits ants. Very much subject to wilt disease.	Badly attacked.
Parbatia ...	290	Very slight damage by white ants ...	Slightly attacked.
Malida ...	570	Slightly more damage than in *parbatia*, but insignificant attack.	Not attacked at all.

The damage by *illi* probably depends largely on the amount of cloudy weather which takes place during the ripening season. *Malida* being later probably experienced less cloudy weather.

Oats.—The Dinapur variety was grown on a small scale and did fairly well. This crop is recommended for wet places in embanked fields, which are usually left unsown with wheat, as they do not dry soon enough to permit wheat to be sown.

In such situations, late sown wheat is most liable to suffer from rust (Puccinia), a disease to which oats in this country appear to be immune.

Wheat.—The season on the whole was favourable for this crop. Late rains in November delayed sowings, and it was noticed that all wheat sown after the November rains was particularly disappointing, while that sown before was very good. This was the case all over the Nerbudda valley and is difficult to account for, except by the fact that a harrowing was not given to the land after the November rains before sowing, as cultivators were in a great hurry to sow before it was too late.

Showers and cloudy weather in January induced a slight attack of rust, but this was not sufficient to affect the crop or afford an accurate test as to the behavior of the different varieties in a bad rust year. Black rust (*Puccinia graminis*) was as usual most abundant, but orange rust (*Puccinia triticina*) was also sparingly present, and one variety suffered from what was apparently a mild form of yellow rust (*Puccinia glumarum*). Arrangements have been made to test some of the more promising hybrids at Orai Farm (United Provinces) next year by the courtesy of the United Provinces Department of Agriculture, as this part of Bundelkhand appears to suffer more frequently from bad rust attacks.

The following statement shows the behavior of some of the varieties, grown under irrigation, to the different rusts :—

Variety.	P. Graminis.	P. Triticina.	P. Glumarum.
Comeback (Australian) ...	A few spots ...	*Nil.*	*Nil.*
White loaf (do.) ...	*Nil.*	do. ...	do.
Firbank (do.) ...	A slight attack ...	do. ...	do.
Federation (do.) ...	*Nil.*	A few spots ...	do.
Johnathan (do.) ...	do. ...	*Nil.*	do.
John Brown (do.) ...	do. ...	do. ...	Abundance in a mild form.
Warren (do.) ...	do. ...	do ...	*Nil.*
Bobs (do.) ...	do. ...	A slight attack ...	do.
Russian ...	do. ..	do. ...	do.
Kaurya, Berar ...	Abundant ...	Slight attack ..	do.
Panike, Nimar ...	do. ...	do. ...	do.
Sukerhai pissi, Nerbudda ...	do. ...	*Nil.*	do.
Raipuri *pissi*, Raipur ...	do. ...	Abundant ...	do.
Mundi pissi, Jubbulpore ...	do. ...	do. ...	do.
Murya, do. ...	A slight attack ...	A slight attack ...	do.
Hansi pissi, Mandla ...	Abundant ...	*Nil.*	A few spots.
Hard *pissi*, Chhattisgarh ..	do. ...	A few spots ...	*Nil.*
Red *Katha*, Chanda ...	do. ...	Abundant ...	A few spots.
Dahutia, Hoshangabad ...	Moderate attack ...	Moderate attack ...	*Nil.*
Jalalia, do. ...	Abundant ...	Abundant ...	do.
Soharia, do. ...	do. ...	do. ...	do.
Bansi, do. ...	A few spots ...	One or two spots ..	do.
Hansia, Saugor ...	Slight attack ...	Slight attack ...	do.
Bangasia, do. ...	Moderate attack ...	do. ...	do.
Dhanagehun, Jubbulpore ...	do. ...	do. ...	do.
Khapli, Akola ...	*Nil.*	One or two spots ...	do.

Khapli, *bansi*, and one or two of the Australians are promising from this point of view. The latter are, however, mostly late and are moderate yielders under local conditions, but give fair crops where irrigation is available and are remarkable for their long clean straw. The behavior of many other wheats was also noted.

Field tests for outturn were carried out on specially tested land in $\frac{1}{8}$ acre plots. Twelve selected types of local varieties were tried on *maryar* land unirrigated and under local conditions of cultivation :—

No.	Class of wheat.	Name.	Outturn per acre in lbs.
1	Bread ...	*Sukerhai pissi*	564
2	Do. ...	*Mundi do.*	500
3	Do. ...	*Hansi do.*	500
4	Do. ...	Hard do.	502
5	Macaroni ...	*Bansi*	570
6	Do. ...	*Jalalia*	566
7	Do. ...	White-bearded *kathia*	634
8	Do. ...	Red do. do.	612
9	Do. ...	*Dahutia*	604
10	Do. ...	White-bearded *hansia*	586
11	Do. ...	Red do. do.	592
12	Do. ...	*Soharia*	420

Of the bread wheats, Nos. 2, 3 and 4 are strong wheats, but their outturns do not compare favourably with the soft white *sukerhai pissi* so commonly grown, and even if hard wheats were in demand in local markets, they would hardly pay to grow, although Nos. 2 and 3 especially are of very good quality.

The Macaroni wheats on the whole are bigger yielders than the bread wheats, but are, as a rule, in local demand for private consumption only. The two *kathias* have given the biggest yield, but their quality is much inferior to such wheats as *dahutia* and *hansia* which have hard yellow grains. The former of these was raised on the farm and is specially promising, as its quality is very good.

A large number of these wheats have been raised on this farm and have been tested together with several Australian varieties.

The following statement shows the outturns of some of these new wheats, which were grown on unirrigated *morand* soil, and of which the areas sown were sufficiently large to give accurate results :—

This soil was inferior to *maryar*.

Name or No.	Type.	Outturn per acre in lbs.	Remarks.
Tigharia ...	Macaroni ...	716	Very early : suitable for Nagpur country.
Daudkhani ...	do. ...	522	Very large grained wheat.
A-006 ...	do. ...	757	Slightly damaged by white ants.
A-007 ...	do. ...	804	
Comeback ...	Australian ...	428	
Murya ...	Bearâless soft *pissi* ...	689	Suited for Jubbulpore embanked land.
A-003 ...	Bearded hard *pissi* ...	1,027	Suited for Jubbulpore embanked land. Smaller area than the others.
A-012 ...	Bearded soft *pissi* ...	590	Suffered badly from white ants.
A-013 ...	do. ...	619	

Some of these varieties are very promising and will be tested on a larger scale on *maryar* land against some of the best local varieties.

A large number of other selections and hybrids are under observation, and many of them are promising yielders and will be tried on a larger scale next year.

SEED DEPÔT.

The demand for good seed is steadily growing. Prices slightly higher than local rates are charged, as a rule, in the case of selected seed. The demand for selected wheat seed was particularly strong from the Jubbulpore and Seoni Districts, where local seed stocks are notoriously inferior.

A superior variety of *maghai til* was also in strong demand. It is quite impossible to supply all the demand from the farm, and selected seed is now only sold to selected persons, generally members of the Agricultural Association, who guarantee to start seed farms with a view to propagating the seed for the use of their particular districts.

List of seeds supplied from the Farm Depôt for seed purposes only.

Name of seed.	Quantity in pounds.	Name of seed.	Quantity in pounds.
Selected wheat—		*Peas—*	
Sukerhai pissi ..	6,530	Khaperkheda ...	245
Bansi ...	2,140	Acclimatized ...	110
Jalalia ...	1,131	Total peas ...	355
Soharia ...	590		
Various *pissis* ...	840	*Ground-nut—*	
Total wheats	11,234	Small Japanese ...	31
		Big Japanese ...	31
Cotton seed—		Mauritius ...	4
Saugor *jari* ...	1,904	Egyptian ...	80
Rosea *jari* ..	142	Chinese No. 2 ...	80
Others ...	11	Total ground-nut ...	226
Total cotton seed ...	2,057	*Tur—*	
Gram—		Nagpur *tur* ...	147
		Bilaspur *tur* ...	10
Local gram ..	2,800	B-o-15 ...	2
Malida gram ..	434	B-o-25 ...	67
		B-o 21 ...	10
Total gram .	3,234	Total tur ...	236
Sesamum—		Soy beans ...	54
		Jubulpore *san* hemp ...	400
Purvi maghai til .	600	Dinapur oat ...	330
Other varieties ..	2	Saoner *juar* ...	32
		Yellow *mung* ...	70
Total til ...	602	Miscellaneous ..	22

Statement showing the details of cropping during 1910-11.

Crop.	Area.	Crop.	Area.
Experimental Kharif—	Acres.	*Non-Experimental Kharif—*	Acres.
Cotton ...	3·80	*Jari* cotton	15·21
Cotton-*tur* ...	·60	*Jwari*, *urid* and *mung* ...	6·00
	4·40	Cotton varieties ...	2·42
		Motia tur and *ambadi* ...	7·38
Experimental Rabi—		*Tur* varieties ...	1·52
		Bilaspur *tur* ...	·42
Soharia ...	6·00	Soy bean ..	·28
Pissi ...	2·50		33·23
Gram .	·50		
Wheat and gram ..	·40	*Non-Experimental Rabi—*	
Terra	·20		
Linseed .	·20	White *pissi* ...	66·91
Masur ...	·20	*Soharia* ...	57·42
	10·00	Rustp oof *bansi* ...	1·00
		Red-headed *jalalia* ...	·75
Total Experimental Plots ...	14·40	Gram ...	23·20
		Hansi *pissi* ...	6·00
Garden Crops—		Wheat varieties ...	11·97
		White linseed ..	3·85
Sugarcane ..	·50	Linseed varieties ...	2·50
Chillies ...	·20	Khaperkheda peas ...	·65
Ground-nut ..	1·07	Acclimated peas ...	·63
	1·80	Oats ..	82
		Birra ...	1·50
Double-cropped Area—		*Maghai til* and *tur* ..	19·86
			197·08
Bajra and *pissi* ..	·50		
Sunhia and *pissi* ..	·50	Total Non-experimental Crops ...	230·89
Paddy and *pissi* ..	·10		
Paddy and gram. ...	·50		
	1·60	Total Cropped Area ..	248·09

IMPLEMENTS AND MACHINERY.

Ploughs.—Further trial was made with iron ploughs which turn a good furrow to a depth of 6". A plough is needed of moderate draught, if worked in the hot weather after showers of rain. None of those tried have proved quite successful on black wheat soils. The Hindustan plough of Messrs. Ransomes, Sims and Jefferies, Limited, is of splendid finish and did fair work, but will not work evenly if the soil is at all dry.

The Watts and Meston ploughs of Messrs. Burn & Co. may prove useful on the lighter classes of soils for ploughing during the rains. They are very cheap, but of indifferent finish and the shares are so brittle that they break very easily. The Turn-wrest plough does excellently for hot weather ploughing, but the strain on the cattle is great.

Reapers.—With the assistance of Mr. Cove a modified Rajah Reaper was designed to suit local conditions and is now being constructed by Messrs. John Wallace and Sons of Glasgow. This machine has a 3' 9" cutting bar and is much lighter in construction and geared higher to suit the short slow walking cattle of these parts.

Seed drills.—A double and a single coultered seed drill have been constructed. They are each supplied with an automatic arrangement, which regulates the seed-rate. These machines are still in the experimental stage, but it is hoped to give them a thorough trial this sowing season.

Winnower.—Various slight modifications in the construction of this machine have been made with a view to cheapening it and rendering it more efficient. The Rasulia Mission, Hoshangabad, are now prepared to sell this machine at Rs. 100, delivered at any railway station in the Central Provinces.

Experiments have been made with a simpler machine, which blows the chaff from the corn without sifting or grading the grain. Such a machine will, it is anticipated, meet with a need of the cultivator, who is badly handicapped if wind fails during the hot weather. Details of this machine have been worked out and a pucca one is now being built as a standard. It is expected that the cost will not be more that Rs. 40, and, if so, it will be within the reach of the pockets of many who cannot afford a winnowing machine proper.

Mr. Cove, pending his appointment as Headmaster of the School of Handicrafts, was attached to this Circle, and his training as a mechanical engineer proved valuable in working out the details of these new machines. Sanction has been received for the purchase of an oil engine and a centrifugal pump, which will be set up on the big well on the farm. This is intended to act as a demonstration and already several people have applied for advice with regard to pumping machinery. In each case of this sort the site proposed for the pumping plant is inspected by a responsible member of the Department and advice given as to whether the site is suitable or not.

People are advised to set up pumping apparatus of the same type as that on the farm, so that, if a break down occurs, the services of the farm *mistri* may be available.

IMPLEMENT DEPÔT.

The number of winnowers sold was less than last year and the decrease is due to the absence of rain during the winnowing season. The greatest demand for these machines is in Narsinghpur District, but other districts of the Jubbulpur Division are also beginning to ask for this machine.

An agreement has been entered into with Messrs. Burn & Co., who will stock approved machines and implements at this depôt and will also open several sub-depôts at important centres in the Circle. These sub-depôts will be financed by Messrs. Burn & Co. in agreement with a local merchant who will act as agent. They will be supervised by the Department and will have a trained *mistri* attached to each, whose services will be available for repairs to

machines working in the district. The want of trained mechanics who can effect repairs has been felt for some time, and has retarded the spread of improved machines.

On the other hand, several merchants have already begun to stock certain improved machines. Thus a merchant at Damoh and another at Bohani (in Narsinghpur District) have sold a dozen or more two roller iron sugarcane mills each to local cultivators, and in Khandwa the improved iron box mote is now regularly stocked in certain *mistris'* shops.

Other instances showing the increased demand for improved machinery also probably occur.

List of machines sold during the year 1910-11 *from the Implement Depôt at Powarkhera.*

Name of machine.	No. sold.	Remarks.
Winnowers ...	53	Including 4 old winnowers which had been repaired and sold.
American maize shellers ...	3	
Manohar plough ...	1	
Turn-wrest ploughs ...	4	
Turn-wrest plough shares ...	6	
Tifan ...	2	
Yoke ...	1	
Other iron ploughs ...	2	
Iron motes ...	5	
Seed bin ...	1	
Argara ...	2	Exclusive of those required for cultivators in the Patan tahsil, where arrangements were made to construct them locally.
Daura ...	2	
Dundia ...	2	
Country hand gins ...	3	
3-Roller sugarcane mill ...	1	
2-Roller " " ...	2	
Pitcher spout pumps ...	5	
Total ...	95	

Statement showing the receipts and expenditure of the farm for the financial year 1910-11.

Heads.	Amount.	Total.
	Rs. a. p.	Rs. a. p.
Receipts.		
Commercial sale of produce	4,205 9 7	
Distribution of seed	1,027 11 7	
Miscellaneous	447 2 10	5,680 8 0
Expenditure.		
Charges for seed grain	47 13 1	
Purchase of cattle and implements	417 9 6	
Employees paid from contingent grant	486 5 9	
Farm buildings and roads	400 0 0	
Postage charges	67 2 6	
Service telegrams	0 6 0	
Feed and care of cattle	784 8 0	
Irrigation	1,482 2 0	
Manure	1 11 6	
Variable labour	604 7 8	
Earth-work	27 8 0	
Packing and freight	59 13 6	
Binding charges	0 8 0	
Miscellaneous	85 0 10	4,465 0 4
Establishment.		
Pay of Agricultural Assistants and Clerk	4,563 10 10	
Pay of servants	1,276 6 5	
Travelling allowance	596 8 0	6,436 9 3

The receipts are again very satisfactory and compare favourably with last year, more especially if it is remembered that, owing to the extremely unfavourable season, the area under cotton realized little profit and the whole of the stock of *maghai til* has been reserved for sowing purposes.

Under contingencies Rs. 1,500 have been drawn towards the cost of an oil engine, which is being purchased for irrigation purposes at once.

G. EVANS,

Deputy Director of Agriculture,

Northern Circle, C. P., Hoshangabad.

Annual Report of Nagpur College Farm for the year 1910-11.

During the year the Ambajhari nala, bridge and dam have been completed and irrigation begun on both sides of the *nala*. Only a small area was irrigated from this source this year, as the late continued rains delayed to some extent the erection of the irrigation plant. This coming year more land will be prepared for irrigation. At the time of writing this report, preparations are going forward for the construction of a road from the bridge to the Lendra farm along a minor *nala* which flows into the Ambajhari *nala* near the new bridge. At the same time steps will be taken to control this *nala* and prevent its erosion, which of late has been responsible for some considerable damage to the neighbouring field margins. A bund has been erected to prevent field scouring near the side of the Ambajhari *nala*, and during this hot weather one or two other bunds will be built and strengthened between the Ambajhari *nala* and the Lendra farm, while several existing in that area will be abolished. The construction of three servants' quarters near the Nagpur farm buildings has been begun; these will be largely built by the help of farm labour. The construction of the dairy building has been commenced near the Lendra farm, and during the coming year this should be completed and cow and calf sheds begun. A small area near the Nagpur buildings was placed under tile drainage; the effect was excellent. Maize sown in that area, and generally poor on account of water logging in the heavy soil, grew quite well in the drained portion. The tiles were locally made. The upkeep of the farm roads and ditches already in existence makes a large call on the farm labour time during the hot weather. The cracking of the black soil below and the passage of unwheeled implements above are largely responsible for the destruction of the kutcha roads which traverse the farm.

The dung pits near the Lendra building will be covered in by corrugated iron before the commencement of the rains.

2. A number of old experiments have been dropped this year, and several others have taken their place. These are chiefly of a character showing the effect of different soil treatments on the growth of a crop. They are arranged partly for experimental purposes and partly as object lessons for students in training at the College. As this is the first year of report on these, few remarks are called for. Several other changes have been made in the laying out of the farm with a view to increasing its educational value:—

(1) Five series of observation plots are now laid out—

- (*a*) heavy land *kharif* crops laid out in groups under cereals, pulse, fodder, etc.,
- (*b*) light land *kharif* crops in the same grouping,
- (*c*) *rabi* unirrigated field crops,
- (*d*) garden and irrigated crops,
- (*e*) variety series, embracing selected varieties of all the most important of the above, laid out in groups of each variety. Nearly 300 observation plots were planted.

(2) A large area of land has been put at the disposal of students of the College. This extension is chiefly devoted to experimental management plots and garden crop cultivation plots for the third year students.

(3) Several demonstration plots, illustrating cropping rotation and culture suitable or in use under different soil and climatic conditions in the Central Provinces, have been laid out.

(4) Land has been set aside for the Economic Botanist and his plant breeding and selection work. This area will be extended during the coming year, and placed more directly under his control.

3. With the establishment of a teaching dairy near Lendra, that section of the farm will in course of time be chiefly devoted to fodder and soiling crop cultivation. The work in the near future connected with this area will chiefly be that of protecting it against erosion, raising the productive capacity of the land, and making it as suitable as possible for the purpose to which it will be

largely devoted. During the coming year it is expected that a small sewage experimental plant will be established on the farm, to test how the local soil will behave under sewage irrigation.

4. The farm has been under the charge of Mr. Hiralal who has conducted things in a distinctly efficient manner, especially when it is borne in mind that the farm work has been considerably handicapped by lack of assistants. For a large part of the year the farm has been staffed by only two men and the assistance of a third, who, though a College lecturer, has been largely employed on the farm. When it is borne in mind that Mr. Jiyalal, who has assisted Mr. Hiralal on his farm, has to spend most mornings conducting demonstration and practical work and Mr. Phatak, the College lecturer referred to above, had to give a certain amount of time to his College work, it will be noticed that the farm has been run at times almost single handed. This lack of junior assistants has been largely responsible for the comparatively slow improvement of the Lendra side of the farm, as the Superintendent cannot be everywhere, and when he is engaged on the experimental areas it is practically useless to send unsupervised labour to do the work required on the Lendra side. Mr. Hiralal and Mr. Jiyalal are both worthy of commendation for the amount and style of work they have got through. I should mention here that a third-year student, Mr. M. R. Joshi, learning agriculture in a purely practical course on the farm, assisted to the best of his capacity in meeting the difficulties experienced in the want of suitable supervision in field work, by working considerably overtime and practically acting as a probationer.

Rainfall, 1910-11.

Month.		No. of rainy days.	Rainfall.	Average of the preceding 36 years.
			Inches.	Inches.
June	1st half	6	5·54	2·25
	2nd half	7	9·57	5·50
July	1st half	9	10·54	6·58
	2nd half	5	2·38	7·43
August	1st half	7	6·91	6·16
	2nd half	5	4·11	5·63
September	1st half	5	4·83	4·58
	2nd half	9	3·92	3·59
October	1st half	2	2·04	1·05
	2nd half	...	...	1·00
November	1st half	3	3·11	·46
	2nd half	...	...	·72
December	1st half	...	...	·12
	2nd half	...	...	·36
January	1st half	1	1·06	·27
	2nd half	...	...	·14
February	1st half	...	...	·19
	2nd half	...	...	·25
March	1st half	1	·20	·18
	2nd half	...	...	·20
April	1st half	...	...	...
	2nd half	...	...	...
May	1st half	...	...	...
	2nd half	...	...	...

5. The season has been notable, in that the rains began early and were carried well into October, and that in September, especially during the last fortnight, the rainfall was heavier and more frequent than has been the case for several years. The rainfall during June and the first week of July was well in excess of the average. This was followed by a long spell of fine weather, so that it became a question whether the young seedlings planted before this would survive. The break, however, ended in time. This break after a long period of rain was distinctly beneficial for the cotton sown on the farm before it commenced. Indeed in August the character of the crop gave every indication of being a bumper one on the farm. *Juar* sown early did not do particularly well. This was due to an attack of stem-borer during the period of checked growth, as plants unaffected by the insect grew successfully. *San* hemp and Sorghum responded to the period of dry weather and grew well. Following this spell of fine weather, rain was almost continuous till the end of September. The amount falling at one time was not great, but incessant rain had its effect on the cotton, and the outlook at the end of September was not that of an average yield, as the plants had made but small progress.

The heavy showers in November caused further damage to the cotton and reduced the outturn. Rabi crops on the farm did well, especially linseed, which though sown late and in some cases on a poor bed did very satisfactorily. Taken all over, with perhaps the exception of the damaging showers in November, the year has not been a bad one.

SERIES L.—SUBJECT.—To test the value of artificial manures for cotton. Area of each plot is ·10 acre.

Plot I.—Nitrate of soda=20 lbs. nitrogen.
Superphosphate=50 lbs.
Sulphate of potash=35 lbs.

„ II.— Do. without sulphate of potash.
„ III.— Do. do. superphosphate.
„ IV.— Do. do. superphosphate and sulphate of potash.
„ V.— Do. do. nitrate of soda.
„ VI.— Do. do. sulphate of ammonia 20 lbs.
„ VII.— Do. do. superphosphate.
„ VIII.—Unmanured.

CROP.—*Cotton (jari) Nagpur.*

No. of plot.	Outturn per acre.												
	1906-07.		1907-08.		1908-09.		1909-10.		1910-11.				
	Lint.	Seed.	Lint.	Seed.	Lint.	Seed.	Lint.	Seed.	Lint.	Seed.	Value of produce.	Cost of manure.	Gross value deducting cost of manure.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ..	330	540	252	487	146	272	204	415	70	122	31 3 3	37 7 0	—6 3 9
II ..	304	496	227	441	149	277	161	327	60	122	27 4 7	28 14 6	—1 9 11
III ..	304	496	240	465	176	329	193	392	70	117	31 0 9	23 14 6	+7 2 3
IV ...	289	471	221	429	17	326	179	359	60	120	27 3 7	15 5 10	+11 13 9
V ..	91	268	129	252	97	181	127	259	60	106	26 12 7	22 1 4	+ 4 11 3
VI ...	148	242	83	162	50	94	76	155	40	64	17 10 5	13 8 0	+ 4 2 5
VII ...	197	323	111	214	61	114	86	176	30	76	14 1 9	8 8 8	+ 5 9 1
VIII ..	194	316	119	230	67	124	75	154	30	58	13 8 9	...	...

The yields are too much below average to allow any conclusions or remarks being made.

SERIES M.—SUBJECT.—To determine the comparative value of cattle-dung and urine as manures; the urine being consumed by the dry earth system.

Area of each plot is ·08 acre.

Plot I.—Dung and urine of two bullocks for 30 days conserved by dry earth.
„ II.—Dry excreta alone of two bullocks for 30 days.
„ III.—Urine alone of two bullocks for 30 days conserved in dry earth.
„ IV.—No manure.
„ V.—Same as plot I.
„ VI.— Do. „ II.
„ VII.— Do. „ III.

No. of plot.	Outturn per acre.														
	1906-07.		1907-08.			1908-09.			1909-10.			1910-11.			
	Wheat grain.	Wheat straw.	Juar fodder.	Wheat grain.	Wheat straw.	Juar fodder.	Wheat grain.	Wheat straw.	Juar fodder.	Wheat grain.	Wheat straw.	Juar fodder.	Wheat grain.	Wheat straw.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
I ...	200	687	1,183	186	264	6,225	375	400	5,287	750	975	4,737	732	600
II ...	131	437	797	181	256	6,000	315	372	5,187	448	701	4,687	605	556
III ...	200	687	1,195	164	211	6,975	292	333	5,087	509	645	5,237	631	548
IV ...	131	400	645	137	212	4,200	337	375	3,087	464	636	3,500	497	473
V ..	200	625	929	137	262	6,300	453	459	5,125	762	812	5,462	759	708
VI ...	162	600	686	161	176	6,137	366	409	4,025	603	709	4,375	630	614
VII ...	178	562	964	81	156	5,362	355	372	4,150	637	637	4,700	670	683

This experiment, as in the past, emphasizes the value of this preservation of urine on the part of the cultivator, even if he turns his dung.

SERIES D.—SUBJECT.—To test the effect of superphosphate seed rate and cutting on fibre crops. Area of each plot is ·10 acre.

CROP.—*San hemp.*

No. of plot.	Treatment.	Rate of seed sown per acre.	Outturn of fibre per acre.		Remark.
			1909-10.	1910-11.	
			lbs.	lbs.	
I	Superphosphate 3 mds. per acre.	40 lbs. per acre ...	45	460	Cut when dead ripe.
II	*Nil* ...		37	390	
III	*Nil* ...		104	360	Cut earlier when seed has formed.
IV	Superphosphate 3 mds. per acre.		143	380	
V	Do. ...	60 lbs. per acre ...	69	580	Cut when dead ripe.
VI	*Nil* ...		60	370	
VII	*Nil* ...		145	330	Cut earlier when seed has just formed.
VIII	Superphosphate 3 mds. per acre.		160	540	

A very favourable season for *san* hemp. A considerable increase is shown by using superphosphate. Cutting this year in the case of early cut plots was done at a later date than last year (*i. e.*, flower stage) which was evidently too early; cutting when the plant is dead ripe appears to compare favourably with the earlier harvest.

SERIES E.—SUBJECT.—Effect of tillage to various depths on which grown continuously.

The area of each plot is ·25 acre.

Plot I.—Scarified (*bakhared*) every year.
„ II.—Ploughed once with country plough and scarified.
„ III.—Ploughed with Swedish plough and scarified.
Plots not manured and not irrigated in the year under report.

No. of plot.	Outturn per acre.												Cost of special treatment per acre over that of *bakhar*.	Cost of cultivation per acre.	Value of produce per acre.
	Average, 1901-02 to 1905-06.		1906-07.		1907-08.		1908-09.		1909-10.		1910-11.				
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw			
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	573	707	480	1,124	321	415	550	597	704	916	513	646	...	17 8 0	21 0 5
II ...	655	819	628	1,680	428	548	592	632	812	920	537	647	0 8 0	18 0 0	21 14 2
III ...	089	905	632	1,864	425	563	602	654	801	918	559	640	0 12 8	18 4 8	22 10 3

The straw this year in all plots was practically alike. Deeper cultivation in the rains still shows an advantage on the preparation of land for *rabi* crops. This point may be claimed to be proved after 10 years of experiment, in which in no case, except in the first year, has the yield from ploughed land (plot 3) been less than from that *bakhared*.

SERIES N.—SUBJECT.—To test the effect of different cultural treatment of plots. Area of each plot is ·10 acre.

Plots not manured in year under report.

No. of plot.	Treatment.	Crop grown.	Outturn per acre.				Remarks.
			1909-10.		1910-11.		
			Grain.	Straw.	Grain.	Straw.	
			lbs.	lbs.	lbs.	lbs.	
V	Fallow ...	...	...	...	...	...	
VI	Ploughing with Turn Wrest plough.	Wheat ..	671	1,099	802	864	
VII	Ordinary cultivation ...	Do. ...	800	1,210	795	874	
VIII	Ploughing in *san* hemp (early).	Do. ..	690	1,130	915	1,602	Ploughed on 18th July 1910.
IX	Do. do. (late).	Do. ...	631	858	666	700	Ploughed on 10th August 1910.
X	Ploughing in *san* hemp and superphosphate 2 maunds per acre (early).	Do. ...	513	1,016	995	1,180	Ploughed on 18th July 1910.
XI	Ploughing in *san* hemp and dressing with lime (late).	Do. ...	530	1,020	606	662	Ploughed on 10th August 1910.
XII	Ploughing in *san* hemp very late.	Do. ...	430	970	624	641	Ploughed on 26th August 1910.
XIII	Ordinary cultivation ...	*San* ...	...	*1,240	...	12,670	**Kulthi.*
		Wheat ...	560	1,020	612	647	
XIV	Cultivation after rains ...	Do. ...	650	950	360	360	
XV	Ordinary cultivation ...	Sorghum ...	...	2,070	...	1,330	
		Wheat ...	385	595	481	582	
XVI	Fallow ...	...	...	..	...	...	
XVII	Ordinary cultivation ...	*Kulthi* ...	...	†800	...	1,890	†*Kulthi*.
		Wheat ...	432	587	637	695	
XVIII	Ordinary cultivation	*Mung* .	..	...	...	547	
		Wheat ...	399	751	530	592	
XIX	Ploughing in *kulthi*	Do. ..	331	601	504	600	Ploughed on 15th August 1910.
XX	Do. ...	...	335	657	641	739	Ploughed on 26th August 1910.

SERIES N.—Comparing plots VI and VII, it will be noticed that ploughing the land, which last year produced a poor result, is beginning to show an advantage over *bakharing* Green manuring, it will be noticed, has been done at different periods during the rains; both these done at the earliest opportunity are a good deal better in their results than those done later, whether the crop was the more fibrous *san* or the more succulent *kulthi*. Superphosphate was used to hasten the early growth of *san*. The amount of green matter turned in was larger in this case than in the other (plot VIII), indeed not much short of the amount ploughed in plot IX three weeks later.

The growth of a leguminous fodder, before the wheat crop, appears preferable to a cereal one, and does not very markedly reduce the yield of succeeding wheat, *cf.* plots XIII and XVII with plot XV.

SERIES I-B. Tillage experiments with rotation.

	First year.	Second year.	
Plot No. 1	Cotton	*Juar*	Ordinary tillage and no manure.
„ 2	Do.	do.	—Frequent tillage and no manure.
„ 3	Do.	do.	—Ordinary tillage with farmyard manure.
„ 4	Do.	do.	—Ploughing first and then frequent *bakharing*.

No. of plot.	Area of plot.	Name of crop.	Outturn per acre.		Value of produce per acre.	Remarks.				
			Grain or lint.	Straw or seed.						
			lbs.	lbs.			Rs.	a.	p.	
V	0·10	Cotton ...	80	174	36-11-10	4 *Bakharings* ...	4	0	0	
						3 Hoeings ...	1	8	0	
							5	8	0	per acre.
VI	0·10	Do. ...	80	173	36-11-0	5 *Bakharings* ...	5	0	0	
						6 Hoeings ...	3	0	0	
							8	0	0	per acre.
VII	0·10	Do. ...	60	100	26-9-7	4 *Bakharings* ...	4	0	0	
						3 Hoeings ...	1	8	0	
							5	8	0	per acre.
VIII	0·10	Do. ...	140	250	62-9-6	1 Ploughing (hot weather).	7	8	0	
						2 *Bakharings* ...	2	0	0	
						6 Hoeings ...	3	0	0	
							12	8	0	

SERIES F.—Tillage experiments on *rabi* crops.

Plot I.— Ordinary cultivation.

„ II.—Frequent tillage.

„ III.—Ordinary tillage with manure.

„ IV.—Ploughing in May and frequent *bakharings*.

Crop in rotation-wheat and gram alternately.

Crop—wheat in year under report.

No. of plot.	Area of each plot.	Outturn per acre.		Value of produce per acre.	Remarks.			
		Grain.	Straw.					
	Acres.	lbs.	lbs.	Rs. a. p.			Rs. a. p.	
I	·15	727	800	29 5 0	4 *Bakharings*	...	4 0 0	
					1 Harrowing	...	0 8 0	
						Total ...	4 8 0	per acre.
II	·15	619	721	25 1 11	7 *Bakharings*	..	7 0 0	
					1 Harrowing	...	0 8 0	
						Total ...	7 8 0	per acre.
III	·15	706	731	28 4 4	4 *Bakharings*	...	4 0 0	
					1 Harrowing	...	0 8 0	
						Total ...	4 8 0	
IV	·15	630	702	25 7 0	1 Ploughing (hot weather)	...	7 8 9	
					7 *Bakharings*	...	7 0 0	
					1 Harrowing	...	0 8 0	
						Total ...	15 0 0	

The effect of frequent tillage as shown in this experiment proves nothing at so early a stage in the experiment, though the results are not what I expected.

SERIES I-C.—Spacing experiment with rotation:—

	First year.	Second year.	Juar plantings.
1st Plot	*Juar*	Cotton	Seed sown with *tifan* hvaing lines 12″ apart.
,,	do.	do.	Seed sown with *argada* having lines 18″ apart and distance between plants 6″ apart.
,,	do.	do.	Seed sown with *argada*, having lines 18″ apart and distance between plants 12″.
,,	do.	do.	Seed sown with *argada* having lines 18″ apart and distance between plants 18″.

No. of plots.	Area of plots.	Name of crop.	Outturn per acre.		Value of produce per acre.	Remarks.
			Grain.	Straw.		
					Rs. a. p.	
IX ...	0·10	Juar.	495	6,832	89 15 8	Rate for *juar* grain 45 lbs. per rupee, 3,460 lbs. of *juar* kadbi, 1,000 pullas, at Rs. 40.
X ...	0·10	Do.	962	5,032	79 8 5	
XI ...	0·10	Do.	750	2,330	43 9 7	
XII ...	0·10	Do.	610	2,095	37 12 4	

The results of this experiment are affected by stem-borer. The effect of these was most noticeable in plots 3 and 4. The stem-borer began its attack after thinning to the above distances in plots 3 and 4 had been finished. The result was a much smaller stand than was intended. Stems in the first plot were thinner and finer than in the others. The heads were proportionately small.

SERIES H.—The effect of interculture and spacing on *rabi* crop.

Plot I.—Sown with ordinary *tifan* 12″ apart. } Equal seed rate.
„ II.—Sowing with a *tifan* 18″ apart. }
„ III.—Like first plot, but half seed rate of the first.
„ IV.—Like second plot, but half seed rate of the second.

Crop in rotation.—Wheat and gram alternately:—

No. of plot.	Area of plot.	Name of crop.	Outturn per acre.		Value of produce per acre.	Remarks.
			Grain.	Straw.		
	Acre.		lbs.	lbs.	Rs. a. p.	
I ...	·29	Wheat ...	659	778	26 12 8	
II ...	·29	Do. ...	963	1,015	38 10 2	Two inter-cultivations.
III ...	·29	Do. ...	890	955	35 12 5	
IV ...	·29	Do. ..	806	893	32 8 3	Do.

The growth and development of plants in II and IV were distinctly better than in I and III. Plot IV suffered from a number of blanks in the lines, probably due to inferior germination.

SERIES P.—To test the effect of variations in seed rate on wheat.

Area of each plot is ·10 acre.

Plot I.—130 lbs. per acre.
„ II.—110 „ „
„ III.—100 „ „
„ IV.— 80 „ „
„ V.— 70 „ „
„ VI.— 60 „ „

No of plot.	Outturn per acre.					
	1909-10.		1910-11.			
	Grain.	Straw.	Grain.	Straw.	Value of produce.	Cost of seed sown per acre.
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
I	435	615	527	619	21 6 7	5 3 0
II	395	587	377	410	15 2 10	4 6 0
III	380	610	334	391	13 9 0	4 0 0
IV	377	612	500	614	20 6 9	3 3 0
V	522	607	504	599	20 8 1	2 12 0
VI	666	693	460	521	18 9 8	2 6 0

As yet, nothing approximately conclusive is shown in this experiment.

SERIES I-A.—KHARIF.—Rotation Experiment.

	1st year.	2nd year.	3rd year.	4th year.
Plot I ...	Cotton ...	*Juar* ...	*Tur* ..	Cotton.
„ II ..	Do. ...	*San* ...	*Juar* ...	*Tur.*
„ III ...	Do. ...	*Tur* ...	Do. ..	*Til.*
„ IV ...	Do. ...	Pulse ..	Cotton ...	*Juar.*

Farmyard manure 8 tons per acre in the year in which cotton is grown on all plots :—

No. of plot.	Area of plot.	Name of crop.	Outturn per acre.		Value of produce per acre.	Remarks.
			Grains or lint.	Straw or seed.		
	Acre.				Rs. a. p.	
1	0·10	Cotton *jari*.	70	131	31 7 9	
2	0·10	Do.	50	91	22 6 6	
3	0·10	Do.	90	174	40 10 5	
4	0 10	Do.	110	205	49 7 2	

No remarks.

SERIES G.—SUBJECT.—Dry crop rotations with wheat.

Area of each plot ·17 acre.

Plot I.—Wheat every year.

„ II.— „ and *lakh* alternately.

„ III.— „ and gram „

„ IV.— „ and „ (mixed) every year.

„ V.— „ with subordinate rows of safflower every year.

„ IV.— „ and sesamum alternately.

Plots not manured in year under report :—

No. of plot.	Name of crop.	Outturn per acre.											
		Average 5 years, 1902-03 to 1906-07.		1907-08.		1908-09.		1909-10.		1910-11.			
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain	Straw.	Grain	Straw.	Value of produce.	Average money value of last two years.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
I	Wheat ...	794	1,119	459	676	616	701	934	987	613	693	24 12 8	37 4 10
II	Wheat ...	898	1,564	...	...	623	818	...	...	809	910	32 11 10	41 1 5
	Lakh ...	553	897	1,087	1,012	...	...	893	1,530	...	...	...	...
III	Wheat ...	934	1,639	...	...	588	752	...	...	676	796	27 7 7	23 10 4
	Gram ...	667	582	271	505	...	...	473	935	...	...	...	...
IV	Wheat ... mixed ...	676	1,191	329	435	276	335	588	912	576	624	27 8 5	33 10 0
	Gram ...	162	344	258	307	188	244	182	235	121	135		
V	Wheat ...	476	933	265	382	281	366	512	641	694	605	32 4 1	34 12 3
	Safflower ...	296	951	423	835	282	623	176	400	81	284		
VI	Wheat ...	715	899	...	...	565	653	...	...	969	1,351	39 6 10	27 0 4
	Sesamum ...	123	307	346	1,076	...	...	164	711	...	...	...	...

Little remark is possible.

SERIES I-D.—Implements.

Rotation experiments cotton and *juar*.

Plot.—1st E—Tillage with introduced implements.

Plot.—2nd ,, with country ,,

No. of plot.	Area of plots.	Name of crop.	Outturn per acre.		Value of produce per acre.	Remarks.
			Lint.	Seed.		
	Acre.		lbs.	lbs.	Rs. a. p.	
XIII	0·10	Cotton ...	63	118	28 5 5	
XIV	0·10	Do. ...	63	122	28 7 5	

CROP VARIETIES.

7. *Cotton.*—This was the only crop on the farm which can be classed as a failure. The reasons are given earlier in the report. Varieties were grown, as in past years, by the Deputy Director of Agriculture. This work will henceforth be carried on systematically by the Economic Botanist.

Juar.—This was a fairly satisfactory crop to some extent, reduced by a bad attack of stem-borer. The crop is still under investigation this year in both its botanical and economic aspects.

Seven varieties were tested on ½ acre plots and gave the following results—.

Variety.	Grain per acre.	*Karbi* per acre.
	lbs.	lbs.
Varadi	... 747	3,664
Mahka	... 701	3,215
Chapti	... 1,001	3,693
Detha	... 876	5,681
Lahe	... 952	5,522
Saoner	... 1,030	5,118

The land was of medium quality and unmanured.

Thirty-six varieties were tested on $\frac{1}{20}$ acre plots. The best of these will be examined on a larger area next year.

Four fodder type *juars* were tested on ½ acre plots with the following results:—

	Green fodder.	Dry weight.
	lbs.	lbs.
Sherali Wani	... 4,770	1,905
Utavali	... 8,113	3,410
Nilva	... 8,459	3,278
Kalabondi	... 3,303	1,295

The land and conditions were as in the grain varieties above. The general development was much below average.

Twelve varieties were tested on $\frac{1}{20}$ acre plots. These were sown a little late, and had not made enough progress in the trial in July to stand the continued rainfall later. The crops failed, and are not considered experimentally.

The Economic Botanist had under his observation several varieties from Madras and also several local farms. The former of these had the appearance of useful fodder types and will be tested this year.

Bajra.—A small area was under this crop. It is at present under the observation of the Assistant Botanist.

Maize.—The Jaunpur variety was grown. This variety does well if sown before the rains. Sown in the rains on black cotton soil, the young plant is apt to be injured by excessive water. This year it was grown partly on soil which had been under-drained and partly elsewhere. The progress shown where under-drainage was practised was considerably greater.

Tur.—A successful crop. A small quantity of Hoshangabad *tur* was also grown. This is much later than the local variety, but a much heavier yielder. It will be given a bigger trial this coming season.

Soy bean.—The farm variety, introduced in 1882, was grown on an extended scale this year with and without superphosphate: 10 acres were sown. The land chosen was a field which previously had grown wheat or gram, a lowlying heavy *rabi* field. The outturn was 660 lbs. per acre over the whole area. This variety is a small seeded late one. The percentage of oil is only 13, too low for commercial purposes. It contains a high percentage of proteid and should be a good stock food. It may be regarded as a fodder variety. Some 15 new varieties were tried this year and it is hoped a number of new imported ones will be available for trial, 1911-12. Some of the varieties tried look as if they might be promising.

Wheat.—*Haura* formed, as in the past, the chief wheat grown. The outturn was well up to average. Selected *kathia*, *haura* and two *bansi* wheats were received from Mr. Evans, and given a trial on the farm.

Linseed.—This was an excellent crop all over the farm with the exception of $\frac{1}{40}$ acre test plots in the Principal's linseed breeding section. Seven strains of blue linseed were tried on the farm in $\frac{1}{4}$ acre plots. Some yielded in promising fashion. The uneven tilth on the land at sowing time prevents any definite conclusions.

Gram.—The farm crop was well up to average.

Paddy.—This was only grown by the Economic Botanist.

Chillies and Cucurbits.—A number of varieties were examined by the First Botanical Assistant.

Oats.—This was grown on rather light land following sorghum. Irrigation was given a little too late to do much good.

Statement showing the Receipts and Expenditure of the Nagpur Experimental Farm during the year ending 30th June 1911.

Head.	Amount.	Remarks.
	Rs. a. p.	
Receipts.		
Sale of produce ...	2,348 8 3	
Distribution { Seeds ...	412 0 0	
Distribution { Implements ...	42 4 0	
Rent of Government land (dry cultivation) ...	716 12 0	
„ „ wet „) ...	644 0 0	
Miscellaneous ...	85 1 0	
Inter-departmental transfers ...	809 14 9	
Total ...	5,058 8 0	
Expenditure.		
Salary of Superintendent ...	1,800 0 0	
„ of Overseer ...	1,200 0 0	
„ of Probationer ...	480 0 0	
„ of Clerk ...	480 0 0	
„ of Peons ...	166 4 5	
„ of Establishment ...	3,043 0 6	
Conveyance allowance ...	120 0 0	
Travelling allowance ...	399 14 0	
Purchase of seeds ...	106 8 9	
Farm buildings ...	2,710 2 3	
Repair of road ...	1,039 10 9	
Purchase of cattle and implements ...	3,001 13 6	
Feed and care of cattle ...	148 14 3	
Variable labour ...	2,163 15 3	
Other charges ...	426 8 6	
Postage ...	36 3 0	
Country stationery ...	0 10 0	
Miscellaneous ...	411 0 10	
Total ...	17,734 10 0	

Total area under cultivation on the Nagpur Experimental Farm during the year ending 30th June 1911.

Crops.	Area.	Total.	Grand total.
	Acres.	Acres.	Acres.
A.—Experimental Area.			
(1) *Kharif Crops*—			
Cotton ...	2·30	...	...
Juar ...	·30	...	...
Mung ...	·20	...	...
San ...	·80	...	...
Soy bean ...	·20	3·80	...
(2) *Rabi Crops*—			...
Wheat ...	5·19	...	...
Wheat and gram (mixed) ...	·17	...	...
Wheat and safflower (do.) ...	·17	...	...
Sundia juar followed by wheat ...	·56	6·09	9·89
B.—Non-Experimental Area.			
(1) *Kharif Crops*—			
Cotton ...	21·52	...	...
Juar (for seed) ...	27·39	...	...
„ (for fodder) ...	5·86	...	...
„ (varieties) ...	5·45	...	...
Maize ...	·33	...	...
Tur ...	17·68	...	...
Bajra ...	·81	...	...
San ...	2·77	...	...
Tur (for wilt) ...	·25	...	...
Soy bean ...	13·59	...	...
Cassava ...	2·00	97·65	...
(2) *Rabi Crops*—			
Wheat ...	27·87	...	...
„ (selected) ...	3·75	...	...
Gram ...	35·16	...	...
Linseed ...	18·35	...	...
„ (selected) ...	2·80	...	...
Til ...	5·44	...	...
Peas ...	1·41	...	...
Oats ...	8·00	...	...
Castor ...	3·00	...	...
Masur ...	·10	...	...
Ringni juar ...	·10	...	...
Nagar motha (eradicating experiment) ...	·40	...	...
Kans (do.) ...	·40	...	...
Miscellaneous crops ...	4·75	111·53	209·18
Malguzari class students area ...	2·25	2·25	2·25
3rd year's students' plots area ...	4·26	...	
2nd do. ...	4·66	...	
1st years students plots area for practical work.	7·92	16·84	16·84
Observation series ...	4·05	4·05	4·05
Botanical area ...	2·60	2·60	2·60
Grand Total ...	...	...	244·81

Statement showing the distribution of seed from the Nagpur Experimental Farm during the year ending 30th June 1911.

Name of seed.	Quantity supplied.			
	District and other Government Officers.	Private persons.	Demonstration and Experimental Farms	Total.
	lbs.	lbs.	lbs.	lbs.
Cotton (*jari*) ...	..	40	1,280	1,320
„ (*bani*) ...	...	100	...	100
„ (*buri*) ...	...	69	...	69
Juar (*Saoner*) ...	...	155	10	165
„ (*ramkel*) ...	..	...	30	30
„ (*ringni*) ...	1	5	...	6
Paddy (*gurmatia*) ...	...	..	1,004	1,004
Tur ...	...	84	225	309
Maize ...	2	15	20	37
Ground-nut ...	71	32	...	103
San ...	800	327	1,640	2,767
Soy bean ...	135	80	332	547
Wheat (*haura*) ...	274	...	...	274
Linseed (red) ...	186	1,576	...	1,762
„ (white) ..	...	110	...	110
Gram ...	2	261	..	263
Til (cold season) ...	10	...	...	10
Mustard ...	10	...	...	10
Lakh ...	...	152	...	152
Peas (Khaperkhera) ...	...	7	...	7
„ (Acclimatized) ...	118	25	...	143
Safflower ...	10	...	...	10
Cassava ...	*2,150	*100	...	*2,250
Total ...	3,769	3,138	4,541	11,448

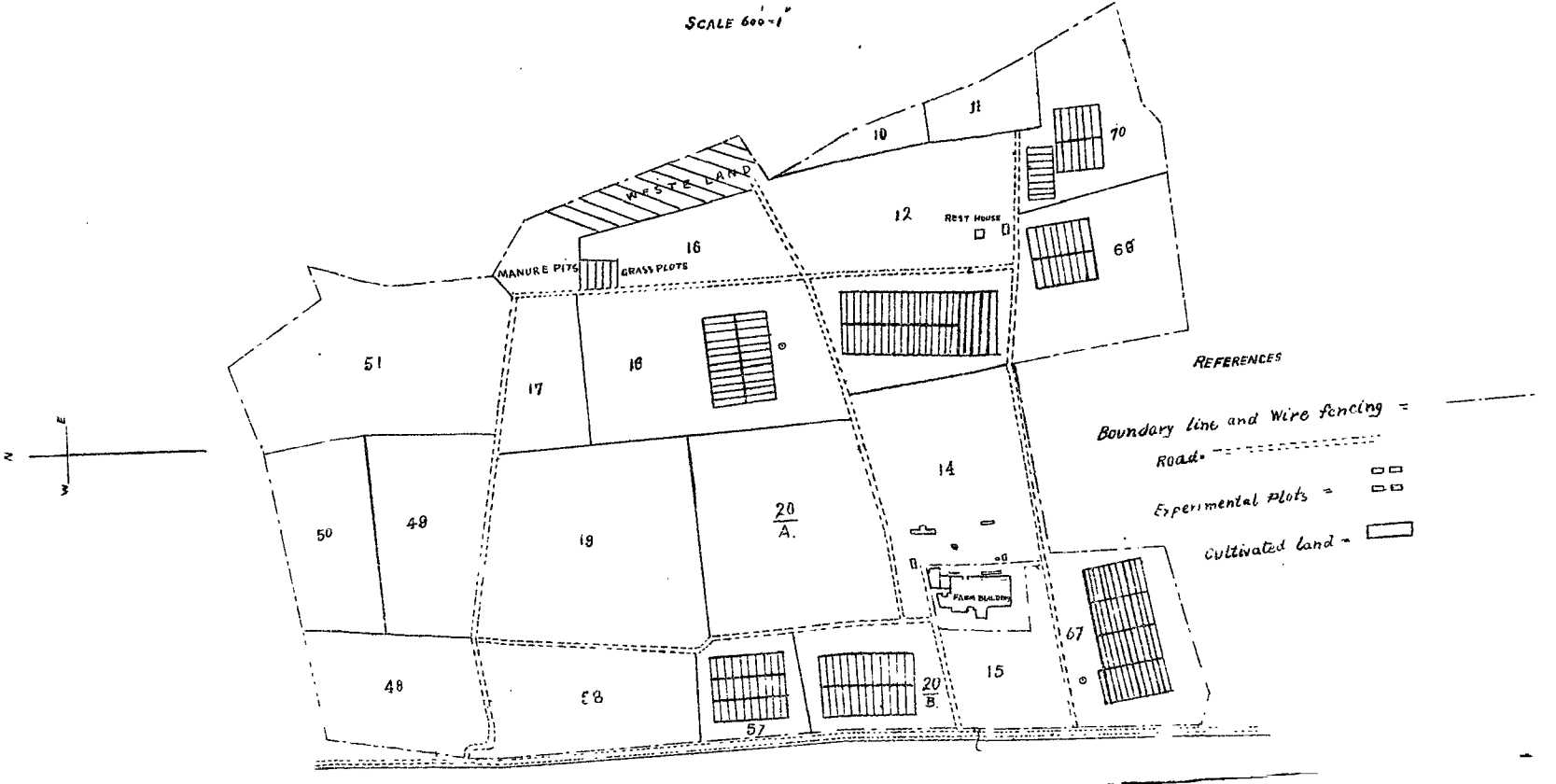
*Number of cuttings.

R. G. ALLAN,

Principal,

Agricultural College, Nagpur.

SURVEY MAP
OF
EXPERIMENTAL FARM
AT
AKOLA
SCALE 600 - 1"



AKOLA FARM.

I. DESCRIPTION.

It is now five years since this farm was started. Within that time all necessary buildings and roads have been completed and a full set of 27 series of experiments suitable for the tract have been started. An area has been set aside for additional experiments and it is being standardised. The farm covers an area of 271 acres; the soil is of the deep black type characteristic of this part of the cotton tract. The analysis is given below :—

	Per cent.
Insoluble silicates and sand	56·11
Peroxide of iron	9·83
Alumina	10·68
Lime	6·59
Magnesia	2·51
Potash	0·37
Soda	0·23
Phosphoric acid	0·08
Sulphuric acid	...
Carbonic acid	4·18
Organic matter and combined water	9·42
Total Nitrogen ...	·03

The soil is a clayey loam, which is rather subject to water-logging during periods of continuous rain and which cracks readily on the loss of moisture.

The farm forms a most useful centre for seed distribution. During the year under report 31,138 lbs. of cotton and 7,130 lbs. of *juar* seed were supplied to cultivators. The price charged for cotton seed was more than twice the bazar price. Cultivators of this Division appreciate the value of good seed and do not therefore hesitate to pay higher prices for seed supplied from this farm. Of the different varieties of cotton seed, *rosea* has been in greatest demand. It has found favour in this Division owing to the extraordinarily high percentage of lint which it gives. There has also been a considerable demand for seed of *buri*, which has done well in rich *khari* fields, and has so far proved immune to the cotton wilt disease which does considerable damage in certain villages. The damage is intensified, I believe, by the system of continuous cropping with cotton commonly practised by many cultivators in Berar. Seed of selected *buri*, *rosea* and *malvensis* has been supplied to 36 seed farms in Berar and 6 in Central Provinces. The experimental farm thus serves as the centre from which the seed farms get their annual supply of selected cotton seed. The owners have agreed to pay for the selected seed supplied to them, so that in future their farms will be entirely self-supporting. The total quantity of cotton seed supplied from the experimental and seed farms for the year amounted to 134,464 lbs.

Some of these cotton seedsmen have also arranged to run *juar* seed farms. Selected *chapti*, *saoner* and *ramkel juar* seed from the experimental farm was supplied to 8 of these farms last year and 12 this year. It enables the department to get a new variety, such as *chapti*, one of the best Bombay *juars*, introduced. The area under *juar* on the farm was 40 acres, which gave an average outturn of 624 lbs. of *juar* grain. At present there is a large quantity *juar karbi* in stock. A part of the surplus *karbi* of last year was stacked outside. The stack was taken down in the cold weather. About one-tenth of the whole, forming the top and sides, was found to be damaged. 1,580 lbs. and 10 ozs of copper sulphate for use as a fungicide were supplied by the farm to cultivators through the members of the District Agricultural Associations and district officials. The quantity given out was sufficient to pickle *juar* seed for 52,687 acres.

That Berar cultivators have had a good year on the whole, and that they are fully alive to the importance of improved cultivation, can be gathered from the fact that in the Division the sale of agricultural implements has more than doubled during the year. Of turn-wrest ploughs alone 139 were sold against 65 last year; no trouble whatever has been experienced in realising the cost.

A very successful divisional meeting of the Berar Agricultural Associations was held on the farm on the 28th of October, at which the Commissioner, Mr. Sly, presided. Members and other enterprising cultivators were invited to be present: these were shown round the experimental and non-experimental areas in batches. They were much impressed by the large fields of pure selected strains of different varieties of cotton and *juar*. In the afternoon papers on different agricultural questions important to this tract were read and discussed. About 600 persons were present. Sanads were presented to eight leading landholders for the part they had played in pushing agricultural improvements. In the end of January a ploughing match was held, in which 35 country ploughs and 8 English ploughs competed. The work done even by the country ploughs was of a high order, most of the ploughs used being the heavy Berar *nagar* drawn by three pairs of superior bullocks, mostly of the strong Khamgaon type. The idea was initiated by Rao Bahadur D. V. Bhagwat, whose intention is to hold an annual ploughing match in a different taluk each year. Prizes and sanads were presented to the winners.

This has been a poor year for cotton in Berar; the crop for the Division as a whole did not probably exceed 60 per cent of that of last year. The average outturn for the experimental farm was 259 lbs. of kapas per acre as opposed to 504 lbs. of last year. The abnormally high price paid saved the situation for the cultivators.

The receipts for the farm for the year were Rs. 12,532-14-6. This exceeded the expenditure Rs. 10,592-13-1, including the pay and travelling allowances of the staff, by Rs. 1,923-9-5; so that the profits made on this farm about covered the cost of the whole agricultural establishment of seven agricultural assistants maintained in Berar including four employed in district work.

The farm was visited during the year by the Commissioner of Berar, by the Deputy Commissioners of Akola and Buldana, by the Imperial Cotton Specialist, by the Agent of the Akola Branch of the Bank of Bombay, by Messrs. Ralli Brothers' Agent of Akola, by the Executive Engineer and by the District Superintendent of Police. Many cultivators came to see the crops or to purchase seeds and implements. In all the farm had 2,300 visitors during the year.

II.—Character of the Season.

The following table shows the rainfall of the year compared with the average for the last four years:—

Month.	Number of rainy days.	Rainfall.	Average of last four years.	Month.	Number of rainy days.	Rainfall.	Average of last four years.
June 1910. First half	7	2·41	1·89	December... First half	...	...	·10
June 1910. Second half	7	6·93	5·07	December... Second half	...	...	1·51
July ... First half	3	2·59	4·18	January 1911. First half	1	2·11	·53
July ... Second half	4	1·49	3·45	January 1911. Second half	...	...	...
August ... First half	11	8·14	5·44	February ... First half	...	...	...
August ... Second half	4	2·84	2·72	February ... Second half	...	...	...
September. First half	6	3·59	2·98	March ... First half	...	...	...
September. Second half	7	4·75	2·15	March ... Second half	...	...	·24
October ... First half	5	1·47	0·37	April ... First half	...	...	...
October ... Second half	...	...	...	April ... Second half	...	...	·01
November. First half	3	·68	·22	May ... First half	...	...	·18
November. Second half	...	...	·10	May ... Second half	...	...	·03
				Total ...	58	37·00	31·17

N. B.—A rainy day is taken as one having ·10 or more cents rainfall.

The first part of the season was again very favourable for cotton and *juar*. The rains began early and were well distributed throughout the growing season. A fall of ·68 in the first half of November, however, did serious damage to cotton. Many mature and immature bolls, as well as flowers, were washed down. The yield was thereby diminished by at least six annas. In the beginning of February the crop was still further damaged by a severe frost, by which the leaves and bolls of *buri* were damaged. The indigenous varieties suffered, too, though to a less degree.

III.—Experiments.

SERIES A.—Subject.—Rotation experiment with *jari* cotton as the principal crop. The plots are manured with cattle-dung at the rate of 40 lbs. of nitrogen per acre in the year in which cotton is grown except in the case of plot IX. In plots III and IV there are six lines of cotton to two lines of *tur*.

Area of each plot ·10 of an acre.

No. of plot.	Crop in 1907-08.	Outturn per acre in 1907-08. Seed cotton or grain.	Outturn per acre in 1907-08. Fodder.	Crop in 1908-09.	Outturn per acre in 1908-09. Seed cotton or grain.	Outturn per acre in 1908-09. Fodder.	Crop in 1909-10.	Outturn per acre in 1909-10. Seed cotton or grain.	Outturn per acre in 1909-10. Fodder.	Crop in 1910-11.	Outturn per acre in 1910-11. Seed cotton or grain.	Outturn per acre in 1910-11. Fodder.	Average value of outturn for four years.
		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.
I	Cotton	160	...	Wheat	410	670	Cotton	467	...	Wheat	520	750	34 15 9
II	Wheat	35	285	Cotton	150	...	Wheat	304	376	Cotton	293	...	22 6 8
III	Cotton	137	...	...	...	...	Cotton	215	...	...	...	...	22 11 3
	...	...	...	*Juar*	220	1,300	...	...	...	*Juar*	465	1,300	
	Tur	76	70	...	...	...	*Tur*	200	240	...	...	...	
IV	...	...	...	Cotton	97	...	...	...	...	Cotton	132	...	27 15 7
	Juar	410	1,910	...	...	...	*Juar*	531	2,045	...	...	...	
	...	...	...	*Tur*	62	72	...	...	...	*Tur*	330	260	
V	Cotton	160	...	Gram	340	580	Cotton	441	...	Gram	544	736	28 15 9
VI	Gram	270	300	Cotton	267	...	Gram	315	1,515	Cotton	384	...	30 10 8
VII	Cotton	182	...	*Tur*	350	102	Cotton	558	...	*Tur*	515	415	30 7 6
VIII	*Tur*	340	415	Cotton	279	...	*Tur*	345	389	Cotton	358	...	32 9 1
IX	Cotton	147	...	Do.	277	...	Cotton	601	...	Do.	348	...	40 0 7

In Berar cotton occupied 41 per cent of the cropped area last year. There is a good deal of variation in the rotations practised. The commonest is cotton followed by *juar*, cotton being sown as a mixed crop with *tur* in the proportion of from 12 to 20 lines of cotton to 2 of *tur*. The *juar* of the rotation is grown entirely for local consumption.

The cotton-wheat and cotton-gram rotations are practised to some extent in the deep black soil of the Purna valley which is very retentive of moisture, and which therefore lends itself to the cultivation of *rabi* crops.

Cotton followed by *tur* is very seldom practised except in the poorer parts of Morsi and the Melghat Taluks.

Cotton grown continuously in the same field for a period of years as in plot No. IX has become a fairly common practice in Berar. This disregard of the principle of rotation in cropping is decried by scientists, who attribute to it the spread of insect pests and fungoid diseases. The results up to date, however, have not justified that assumption. The experiment has now gone on for 4 years; no trace of disease and no serious damage by insect pests have yet been noticed. Economically the practice has proved a sound one owing to the high price of cotton, and it is therefore being followed in the non-experimental area of the farm. Cotton and *tur* in rotation have done very well in both plots, and cotton followed by wheat on one of the two cropped by that rotation.

SERIES B.—SUBJECT.—Tillage Experiment.—*Jari* cotton and wheat are grown in rotation and the plots are manured as in Series A.

I.—*Bakhared.*

II.—Ploughed with native plough and *bakhared.*

III.— „ „ English plough and *bakhared.*

IV.— „ „ „ „ every third year and *bakhared* in other years.

Area of each plot ·20 of an acre.

Number of plot.	Average outturn of wheat for two years (1907-08 and 1909-10).		Average outturn of cotton for two years 1908-09 and 1910-11.
	Grain.	Fodder.	
	lbs.	lbs.	lbs.
I ...	437	618	553
II ...	581	741	506
III ...	571	801	498
IV ...	441	601	525

Ploughing every year has resulted in an increased yield of wheat, due, we believe, to the extent to which the water-holding capacity of the soil is increased thereby. The advantage of ploughing for cotton has not become evident except when the land is foul with weeds. In years of heavy rainfall, in the beginning of the season, such as we had in 1908-09 and 1910-11, our heavy black cotton soil tends to hold up so much moisture that cotton grown in it suffers from water-logging, which reduces the yield. To get reliable results, the experiment will have to be carried on for a period of years including varying conditions of rainfall. From the point of view of its efficiency as a weed eradicator the turn-wrest plough is easily the most effective of the three implements used.

SERIES C.—SUBJECT.—Spacing of cotton plants. The seed is dibbled and the plots manured as in Series A. *Jari* cotton is grown continuously.

Area of each plot ·10 of an acre.

Number of plot.	Spacing distance.		Average outturn of *kapas* for four years per acre.
	Between rows.	Between plants in rows.	
	Inches.	Inches.	lbs.
I	15	7	416
II	15	15	369
III	20	15	382
IV	20	20	382
V	25	15	321
VI	25	25	247

The duplicate.

Number of plot.	Spacing distance.		Outturn of *kapas* in lbs. per acre.		Average outturn for two years.
	Between rows	Between plants in rows.	1909-10.	1910-11.	
	Inches.	Inches.	lbs.	lbs.	lbs.
I	15	7	346	442	394
II	15	15	367	419	393
III	20	15	291	299	295
IV	20	20	314	282	298
V	25	15	358	315	336·5
VI	25	25	250	226	238

The outturns from the different plots of this series show that as we increase the spacing distance of plants of the *jari* cotton under trial from 15″×7″ to 25″×25″ we diminish the outturns. The lesson learnt will be of considerable practical value to officers of this department in their capacity of advisers to the private owners of cotton seed farms, where the spacing in the rows recommended up to date has been from 12″ to 15″. It is possible that on highly manured lands wider spacing will give better results: this will be tested in due course.

SERIES D.—SUBJECT.—To ascertain the comparative advantages of topping plants, the plants being topped when about one foot high. *Jari* cotton is grown continuously. The plots are manured as in Series A.

Area of each plot ·10 of an acre.

Plot.		Treatment.
I	...	Topped.
II	...	Not topped.

No. of plot.	Average outturn of *kapas* per acre for four years.
I ...	392
II ...	466

Duplicate Series.

Number of plot.	Outturn of *kapas* per acre in lbs. for			Average outturn for three years.
	1908-09.	1909-10.	1910-11.	
I	172	266	233	224
II	106	326	303	245

That topping induces increased branching and a greater productiveness in the cotton plant is an old theory in these Provinces. The findings of this experiment up to date show that the theory does not hold good for *jari* cotton at least. When seed farms were first started by the department, the owners were advised

to top the plants, with the view of increasing the outturn. On the strength of the results obtained from this experiment that practice has been given up, as the operation, contrary to all expectation, results in a diminished yield.

SERIES E.—SUBJECT.—To ascertain the relative values of the outturns of different cottons. The plots are manured as in Series A.

Area of each plot ·10 of an acre.

Variety.	Outturn of *kapas* per acre in lbs.				Average outturn of *kapas* for four years.	Percentage of lint, 1910-11.	Value of outturn in 1910-11.	Average value for four years calculated from current year's rates.
	1907-08.	1908-09.	1909-10.	1910-11.				
							Rs. a. p.	Rs. a. p.
Gossypium neglectum malvenis.	240	264	584	403	373	30·00	61 14 9	57 5 0
Gossypium neglectum vera.	182	274	554	361	343	33·60	54 6 3	51 11 3
Gossypium neglectum rosea.	258	342	643	367	402	40·00	63 12 3	69 13 6
Gossypium neglectum rosea cutchica.	194	317	723	415	412	36·30	66 7 3	65 15 9
Berar *jari* ...	255	429	485	318	371	35·70	50 4 6	58 4 9
Buri ...	77	426	416	295	303	33·00	56 3 6	57 15 0
Bani ...	151	246	394	228	255	29·00	39 6 6	44 2 6

The valuations given above are based on the prices actually paid by the Manager, Empress Mills, to whom all our farm cotton was sold and the lint percentages are those obtained from the ginning of these cottons on a large scale on the farm. Samples were also sent to Messrs. Ralli Brothers, Bombay, for valuation whose report is given below :—

No.	Variety.	Valuation of samples on 23rd December 1910.
1	Selected *buri* No. I ...	About fine in class ; staple very silky. Value to-day about Rs. 385 per khandi of 784 lbs. of lint.
2	Do. No. II ...	Fine ; much less silky than sample No. I, staple rather irregular mixed with some shorts. Value about Rs. 370 per khandi of 784 lbs.
3	Selected *malvensis* medium lobed.	Fine to superfine ; staple woolly. Value about Rs. 350 per khandi of 784 lbs.
4	Selected *malvensis* broad lobed...	Fine to superfine ; staple woolly. Value about Rs. 355 per khandi of 784 lbs.
5	Selected *malvensis* No. 4 ...	Fine to superfine ; staple woolly. Value about Rs. 350 per khandi of 784 lbs.
6	Selected *vera* ...	Fine to superfine ; staple woolly. Value about Rs. 355 per khandi of 784 lbs.
7	Selected *rosea cutchica* ...	Choice staple ; very rough and short. *Belati* staple ; very rich bright colour. Value Rs. 315 per khandi of 784 lbs.
8	Selected *rosea* ...	Superfine to choice ; creamy ; some stain ; staple rough. Value about Rs. 345 per khandi of 784 lbs.
9	Selected *bani* No. 3 ...	Fine to superfine ; staple very silky and fine in fibre. Value about Rs. 375 per khandi of 784 lbs.

The results of this experiment are of the greatest interest at the present time when so much attention is being given to the question of growing improved cottons in India. The often discussed question is, "Will the finer stapled cottons give on an average more profitable yields than the coarser types, for which the cultivator at present shows such a marked preference?" The average value

of the crop per acre of the varieties under trial shows that at present market prices in India, our two coarse cottons, *rosea* and *rosea cutchica*, are easily the most profitable for the cultivator of the Central Provinces and Berar to grow. Viewed from the spinners' point of view *bani*, *buri* and *malvensis* are much better cottons. They give lint of better quality, which is in demand for the spinning of higher counts, and which is worth from 20 per cent to 30 per cent more than that of the coarser *rosea*. The cultivator on the other hand knows that owing to the conditions of the trade in India, he does not always get the full value for long staple cotton, nor would the increase in value compensate him for reduced yield even if he did. This explains why the cultivation of *bani* has been given up in these Provinces, and why the demand of the cultivators is for *varadi* or Berar *jari*, the term applied to *jari* containing a high percentage of the coarser types. The superiority of *rosea* cotton lies in the fact that it gives a big yield of *kapas* and an extraordinarily high percentage of lint to seed. The so-called Berar *jari* is a heterogeneous mixture of six distinct races; five of these have been grown as pure varieties for the purpose of this experiment and the sixth, *i. e.*, Upland Georgian, having proved inferior both as a yielder and in the quality of its lint has been dropped in favour of a new introduction, *viz.*, *buri*. Isolated plants of some other varieties are found at times, but these do not form an appreciable percentage of the mixture. The character of the mixture known as *jari*, *varadi* or *katevilayti* differs in different parts of the Provinces. In the Tapti valley the finer types, *viz.*, *malvensis* and *vera*, predominate: in quality the lint of this mixture is probably very similar to that of the *oomras* formerly grown in Berar. In the cotton tract proper, including all Berar, Wardha and Nagpur, the coarser types form the bulk of the mixture, and the result is a cotton giving a comparatively high ginning percentage. The statement below, kindly supplied by the Manager of the Empress Mills, Nagpur, gives, for the last three years, the percentages of lint obtained from this class of cotton at the different ginning factories in Berar belonging to the firm :—

	1908-09.	1909-10.	1910-11.
Yeotmal	35·17	34·16	33·85
Akola	35·00	35·43	34·38
Amraoti	...	35·71	35·40
Nagpur	35·07	35·77	34·67
Wardha	34·33	35·10	34·20

When grown as a pure crop, as is now being done by the department, *rosea* gives at least 10 per cent more lint than this Berar *jari*, and the lint was sold this year to the Empress Mills at the same price as that of Berar *jari*, otherwise known as *varadi* or *katevilayti*. The advantage in growing it is therefore very evident.

With the view of ascertaining the relative values of our long and short stapled cotton in England, samples of *buri*, *bani*, *malvensis* and *rosea* cotton were sent to the Secretary of the British Cotton Growing Association who got them valued in December by Wolstenholme and Holland of Liverpool, and by Gaddum and Company, Manchester. Their valuations and that of the Manager, Empress Mills, Nagpur, are compared below with the price of middling American. The reports are given in full on page 62 of this report: —

	Manager, Empress Mills, Nagpur.	Wolstenholme and Holland, Liverpool.	Gaddum and Company, Manchester.	Middling American in December.
	Pence.	Pence.	Pence.	Pence.
Rosea	6·49	7	6—6·75	
Malvensis	7·42	8·20	7·75—8	8·07
Buri	8·67	7·9—8	8—8·25	
Bani	8·81	8·40	8—8·25	

It will be seen that the value of our long stapled cottons relative to that of short stapled *rosea* was higher in Nagpur than in England, and that, if we had exported the lint instead of selling it locally, the superiority of *rosea* as compared with *buri* and *bani* would have been still more outstanding.

Though *buri* has not proved as profitable as the coarser varieties in this particular experiment, it has done better than *jari* in the rich *khari* lands of some villages where it has been tried. It is also in demand for wilt infested areas: it has so far proved entirely immune to this disease.

Rosea cutchica is slightly inferior to *rosea* in the quality of its *kapas*; it, too, is a heavy yielder and a very hardy variety. The percentage of lint is, however, only 37 as compared with 40 for *rosea*.

Malvensis is capable of great improvement in the quality of its staple: different strains vary greatly in the quality of their lint, and it is therefore hoped that by selection it will be possible to evolve a better type than that under experiment at present in the series above. *Malvensis* has done well in places, and has been preferred to *rosea* by two or three owners of seed farms.

For *bani* there is no hope. Its low yield and poor ginning percentage condemns it in the eyes of the cultivator. The strain which has been propagated on the Akola farm gives 29 as opposed to 26 per cent for ordinary *bani*. It is interesting to note that a sample of this variety sent for valuation to Liverpool over 40 years ago by Mr. Rivett Carnac, the then Cotton Commissioner of these Provinces, was valued as being equal to middling American, and that lint of the strain now grown on the Akola farm is considered better than middling American. The quality of the lint has not therefore deteriorated.

SERIES G.—SUBJECT.—To ascertain the relative values of cattle-dung, saltpetre and poudrette as manures for cotton and *juar* grown in rotation.—The manure is applied in the year in which cotton is grown. The saltpetre is applied as a top-dressing after the plants have been thinned out.

Area ·10 of each plot.

Plot.	Treatment.
I	64 maunds of cattle-dung per acre.
II	*Nil.*
III	64 maunds of poudrette per acre.
IV	2 maunds of saltpetre.

No. of plot.	Average outturn per acre of *juar* for two years, 1908-09 and 1910-11.		Average outturn per acre of *kapas* for two years, 1907-08 and 1909-10.	Average cost of manure for four years.	Average profit due to manure for four years.
	Grain.	Fodder.			
	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
I	534	1,855	364	2 8 0	6 15 6
II	471	1,585	294	...	...
III	554	1,895	435	1 14 0	12 11 9
IV	639	1,885	343	6 12 6	7 6 7

Poudrette proved the most valuable of the three manures applied.

SERIES H.—SUBJECT.—To ascertain the profit to be derived from the use of fertilizers as manures for cotton grown on black cotton soil.—The superphosphate, sulphate of potash and sulphate of ammonia are drilled in at the time of sowing at the rate of 40 lbs. phosphoric acid, 35 lbs. potash and 20 lbs. nitrogen per acre, respectively. The nitrate of soda is applied as a top-dressing at the rate of 20 lbs. nitrogen per acre.

Area of each plot ·10 of an acre.

No. of plot.	Manure.	Average outturn of *kapas* in lbs. for four years, 1907-08 to 1910-11.	Average increase due to manure.
		lbs.	lbs.
1	Nitrate of soda, superphosphate, and sulphate of potash.	470	176
2	Nitrate of soda and superphosphate ...	499	205
3	Nitrate of soda and potash	351	57
4	Nitrate of soda	321	27
5	Sulphate of ammonia	363	69
6	No manure	294	.....
7	Superphosphate and sulphate of potash ...	332	38
8	Superphosphate	362	68
9	Sulphate of potash	344	50

Duplicate series including nitrate of lime.

No. of plot.	Manures.	Outturn of *kapas* per acre in lbs., 1910-11.	Average increase due to manure.
		lbs.	lbs.
I	Nitrate of soda, superphosphate and potash ...	369	145
II	Nitrate of soda and superphosphate ...	344	120
III	Nitrate of soda and potash	296	72
IV	Nitrate of soda	285	61
V	Sulphate of ammonia	255	31
VI	Calcium nitrate	325	101
VII	No manure	224	.....
VIII	Superphosphate and sulphate of potash ...	239	15
IX	Superphosphate	240	16
X	Sulphate of potash	250	26

The effect which these artificial manures have had in increasing the yield of cotton has not been commensurate with the cost of the manure used, though in every case there has been an increase due to its use. Calcium nitrate, which has been tried in the duplicate series, promises to be the most effective form in which to apply the nitrogen; but for this type of heavy black cotton soil in which the experiment is being tried it is doubtful, judging from the results obtained up to date, whether any of these artificial manures can be used economically without the addition of some more bulky organic manure.

SERIES I.—SUBJECT.—To test the effectiveness of a dressing of cattle-dung followed by a top-dressing of nitrate of soda or saltpetre after the plants have been thinned out.—Cotton is grown continuously.

Area of each plot is ·10 of an acre.

Plot.		Treatment.
I	... Cattle manure, 64 maunds	+ 10 lbs. nitrogen as nitrate of soda.
II	... Do. 32 ,,	+ 20 lbs. do.
III	... No manure.	
IV	... Cattle manure, 64 maunds	+ 10 lbs. nitrogen as saltpetre.
V	... Do. 32 ,,	+ 20 lbs. do.

No. of plot.	Average outturn of cotton per acre for four years, 1907-08 to 1910-11.	Average cost of manure for four years.	Average profit due to manure.
	lbs.	Rs. a. p.	Rs. a. p.
I ...	564	12 11 0	43 2 0
II ...	489	17 14 9	33 1 6
III ...	275	.....	.....
IV ...	512	11 5 9	36 10 6
V ...	437	15 3 6	25 0 9

Duplicate series.

No. of plot.	Outturn of *kapas* per acre, 1910-11.	Increase due to manure.
	lbs.	lbs.
I	186	93
II	193	100
III	93	.....
IV	182	89
V	189	96

An application of cattle-dung followed by a top-dressing of nitrate of soda and saltpetre have again given distinctly promising results.

SERIES J.—SUBJECT.—To determine the comparative value of cattle-dung and urine as manures for cotton, the urine being conserved by the dry-earth system.—Cotton and *juar* are grown in rotation and the manure applied every year.

Area of each plot ·10 of an acre.

Plot.	Treatment.
I ...	Dung and urine of 2 bullocks for 30 days.
II ...	Dung alone of 2 bullocks for 30 days.
III ...	No manure.
IV ...	Urine alone of 2 bullocks for 30 days.

No. of plot.	Average outturn per acre of *juar* for two years, 1908-09 and 1910-11.		Average outturn of *kapas* per acre for two years, 1907-08 and 1909-10.	Average profit due to manure per acre.
	Grain.	Fodder.		
	lbs.	lbs.	lbs.	Rs. a. p.
I ...	906	4,275	555	33 15 0
II ...	756	2,790	398	12 0 3
III ...	484	1,960	301	...
IV ...	728	2,955	421	16 6 6

The urine is collected by spreading a 6" layer of dry earth in the stalls which absorbs the liquid manure. By adopting this dry earth system of conserving the urine of his cattle a farmer can double his supply of manure. This practice has been adopted by several cultivators in Berar; others are being urged to start it.

SERIES M.—SUBJECT.—To determine whether it is profitable to sow *juar* and cotton before the rains where these crops are grown in rotation.—The plots are manured as in Series A.

Area of each plot ·10 of an acre.

No. of Plot.	Crop.	Outturn of *kapas* per acre in 1909-10.	Outturn of *juar* per acre in 1909-10.		Outturn of *kapas* per acre in 1910-11.	Outturn of *juar* per acre in 1910-11.	
			Grain.	Fodder.		Grain.	Fodder.
		lbs.			lbs.		
I	Cotton sown before the rains.	580	...	...	254	...	...
II	Cotton sown at usual time.	530	...	...	237	...	...
III	*Juar* sown before the rains.	...	890	3,000	..	495	1,330
IV	*Juar* sown at usual time.	...	774	3,495	...	592	1,455

This practice again proved advantageous in the case of cotton for the year under report, as will be gathered from the yields obtained. On the farm about 70 acres in all of cotton were sown before the regular monsoon set in. The two objections to pre-monsoon sowing are (i) that there is a risk of loss from early germination followed by a long break in the rains, and (ii) that some of the seed is washed into the large fissures formed by the first heavy rainfall. When followed by the dibbling of seed in the blanks which occur, early sowing is, however, profitable. The advisability of sowing *juar* before the rains is more doubtful owing to severe insect attacks which affect an early sown crop. When sown in June, the crop is attacked in July by stem-borer (*Chilo simplex*). This pest kills many stalks and affects the growth of others.

SERIES N.—To test the value of gram as a soil renovator when grown along with cotton, the gram being sown between the rows of cotton after the last weeding of the latter.

Plot	Treatment.
I ...	Cotton with gram.
II ...	Cotton without gram.

No. of plot.	Crop.	Outturn of *kapas* in lbs. per acre.			Outturn of gram in 1910-11.	
		1908-09.	1909-10.	Grain.	Grain.	Fodder.
I	Cotton with gram ...	231	325	159	302	477
II	Cotton without gram ...	230	281	226	...	...

The gram was sown between the rows of cotton during the last week of September after the last weeding of cotton. The yield of gram shows that a fair crop can be raised in this way. That the cotton-gram plot gave less outturn of cotton was at least partially due to its having suffered from water-logging. The continuation of the experiment is necessary to show to what extent, if any, gram can be used in this way as a soil renovator, without interfering with the continuous cropping of the land with cotton.

IV.—Varieties of Crops and Seed Selection.

Cottons.—Almost the whole farm area has been sown this year with pure strains of cotton raised from selected mother plants. Plant-to-plant selection is being continued, so as to provide against the possibility of deterioration. The different selected strains of each variety are being tested with the view of getting the best possible. The selected strain of *rosea* being propagated gives 40 per cent of lint: unselected *rosea* gives only 39. A high ginning percentage would seem to be a hereditary character in cotton, though it is subject to seasonal variations. This selected strain of *rosea* has continued to give 40 per cent or more of lint to seed on the three different experimental farms on which it has been grown. It is the earliest of all the indigenous cottons, too; it was ready for the first picking last season about the third week of October. Numerous crosses between *rosea* and *bani*, *rosea* and *malvensis*, *malvensis* and *bani*, *bani* and *vera* have been raised. The results obtained up to date will be published in next year's report. Reference has been made in the body of this report to the different cottons under trial in the varietal series. Of these *rosea*, *malvensis* and *buri* are being propagated for distribution on the seed farms; but the greatest demand has been for the first of these. *Buri* has so far proved resistant to wilt disease both when grown in the field and in pots. A number of tests were made in pots with soil from a wilt-infested area in Akot. The statement below shows results at the end of September:—

No. of plot.	*Jari.*		*Bani.*		*Buri.*	
	Original number of plants.	Number of wilted plants.	Original number of plants.	Number of wilted plants.	Original number of plants.	Number of dead plants.
1st ...	12	2	19	3	7	...
2nd ...	11	3	12	5	8	...
3rd ...	12	3	12	4	10	...
4th ...	12	2	9	7	9	1

The Assistant Mycologist, who examined the dead plants, reported that they had all died of wilt, with the exception of that of *buri*. Part of the dead *buri* plant was forwarded to Dr. Butler, Imperial Mycologist, for examination, who reported as follows:—"I can find no trace of fungoid infection in the plant. It is probable therefore that the opinion of the Assistant Mycologist that the death was due to some insect attack is correct. You appear to have made a valuable discovery in the resistance of *buri* cotton to the wilt."

Cambodia cotton, which has done so well in Madras, was tried, but gave a poor outturn. This variety is more than a month later than our indigenous varieties and suffers from the early cessation of rains in this part of the country. It grows very luxuriantly under irrigation in Madras, and it is therefore being tried this year in Ramtek and Chanda, where it will be watered when necessary.

Allan's Long Staple was also grown, but did very poorly: most of the leaves died in October with red leaf blight and the plants produced very little lint. The quality of the staple, however, was very good.

Samples of *buri*, *malvensis*, *bani* and *rosea* were sent to the Secretary of the British Cotton Growing Association, Manchester, who reported as follows:—"I have sent these samples to Messrs. Gaddum and Company and enclose herewith a copy of their valuation. (Please see the statement below.) You will see that in their opinion this cotton is totally different to ordinary Surats. It was for this reason that we also sent the samples to our brokers, Messrs. Wolstenholme and Holland, who are more accustomed to dealing with American and Egyptian cottons, and I enclose herewith a copy of their valuation, (embodied in the statement below) which you will see does not differ materially from Messrs. Gaddum's valuation. There is always some difference in valuations, which must be looked on as only approximately correct. The only way to test cotton is by having large quantities to dispose of in the market.

"With the exception of the fourth sample *rosea*, all the samples you sent are useful cottons which could readily be sold in this market at considerably higher prices than are obtained for East Indian cotton, and we hope that there may be some possibility of these cottons being produced in quantity in your district."

Sample No.	Variety.	Valuation by Messrs. Gaddum and Company, Manchester.	Valuation by Messrs. Wolstonholme and Holland, Liverpool.
1	*Buri* ...	Strict superfine, good silky staple, spot. Value 8 to 8·25*d* per lb.	"Fully good middling" in grade. Staple about 1 inch strong, value 7·90*d* to 8·00*d* per lb.
2	*Bani* ...	Do. do.	"Fully good middling" in grade. Staple about 1⅛ inch fine but a little soft. Value 8·40*d* per lb.
3	*Malvensis* ..	Strict superfine, very silky, fair staple, spot. Value 7·75 to 8*d* per lb.	"Fully good middling" in grade. Little stained, staple 1 inch to 1⅛ inch, irregular and rather soft. Value 8·20*d* per lb.
4	*Rosea* ...	Strict superfine, rough, very poor staple, spot. Value about 6 to 6·75*d* per lb.	"Fully good middling" in grade. Staple rough and extremely short. Value 7*d* quite nominal.
		N. B.—We have given the valuation to the best of our ability, but the cotton looks so totally different to ordinary Surats that it is not easy to say what it is worth.	*N. B.*—Liverpool, 31st December 1910, value "middling American 8·07*d* per lb."

Juar.—The best *juars* grown in these Provinces are being tested, and selected seed of *chapti*, *saoner* and *ramkel* have been distributed to the owners of seed farms and other cultivators.

Soybeans.—The variety which has grown for so many years in the Nagpur farm was tried and gave an outturn of 650 lbs. per acre. A Manchurian variety obtained through Rao Bahadur Bhagwat of Akola is also being tried this year.

Grasses.—The number of grasses under trial has been reduced to six. The outturns of which are given in the statement below. The leguminous weed *sheora* (*Alysicarpas rugosus*) was again grown with these and added to their fodder value. When made into hay, *pohna* is the grass most liked by cattle. It is a juicy grass with a slender stem. It forms a good pasture, too, as it is tussocky and covers the ground well:—

No.	Name.	Systematic name.	Weight of grass per acre.	Value per acre.
			lbs.	Rs. a. p.
1	*Lahani marvel* ..	Andropogon annulatus ...	6,624	36 0 0
2	*Mothi marvel* ...	Andropogon caricosus ...	3,960	19 1 3
3	*Kel* ...	Andropogon pertusus ...	3,900	19 3 3
4	*Mushel* ...	Iseilema laxum ...	3,912	23 14 0
5	*Sheda* ..	Ischœmum laxum ...	3,432	21 9 6
6	*Pohna* ...	Setaria glauca ...	6,480	24 9 6

The earliest of these grasses is *lahani marvel* which flowers in the beginning of August, and which, if cut in the end of that month, gives a second cutting in November. It gives a second class hay. It is a heavy yielder if two cuttings are taken.

Mothi marvel is about three weeks later than *lahani marvel.* It gives a second class hay.

Kel is a vigorous grower which flowers in the beginning of September. It develops into a rather coarse grass when grown in manured soil and gives a second class hay.

Pohna and *mushel* flower in the end of August: they give first class hay. *Mushel* is known as *mushan* in Balaghat, *musrut* in Berar and as *dadhera* in Chhattisgarh. *Pohna* owing to its tussocky habit of growth is the best of the grasses for pasture lands.

Sheda flowers in the end of August; it does better in dry hilly soils than in deep black cotton.

Groundnut.—The following varieties of groundnuts were grown on the farm:—

1. Big Japanese.
2. Raipur local.
3. Pondicherry.
4. Spanish peanut.
5. Senegal.
6. Egyptian.
7. Chinese I.
8. Chinese II.
9. Tumboo peanut.
10. Mozambique.
11. Virginia.
12. Cuttack.
13. Berar local.
14. Surti local.

The best yielders were Tumboo, Raipur local, big Japanese, Virginia and Egyptian. Berar local and Surti is the same variety. This variety is very late and a poor yielder. There was some demand for the seed of Raipur local and big Japanese.

STATEMENT A.—Showing the rates used for valuing the produce and manures for the year 1910-11.

Name of crop, etc.	Value.		Remarks.
	Rate.	Per.	
	Rs. a. p.	lbs.	
Jari cotton lint ...	140 0 0	345	
Bani cotton lint ...	190 0 0	345	
Buri cotton lint ...	187 0 0	345	
Malvensis ...	160 0 0	345	
Vera ...	140 0 0	345	
Rosea ...	140 0 0	345	
Cutchica ...	140 0 0	345	
Wheat ...	1 0 0	24	
Gram ...	1 0 0	32	
Tur ...	1 0 0	32	
Juar ...	1 0 0	32	
Juar barbi pulis ...	8 0 0	100	Weighing 12 lbs. each.
Bhusa ...	1 0 0	3 Dulas.	Do. 50 do.
Nitrate of soda ...	13 8 0	112	
Sulphate of ammonia ...	13 0 0	112	
Superphosphate ...	7 0 0	112	
Sulphate of potash ...	11 8 0	112	
Nitrate of potash ...	9 8 0	112	
Cattle dung ...	1 0 0	Cartload.	
Poudrette ...	1 0 0	Do.	
Urine earth ...	2 8 0	Acre.	

Statement showing the distribution of seed and manures during the year 1910-11.

Name of seed.	Cultivators.	Seed farms and Experimental farms.	States and other Provinces.	Total.
	lbs. oz.	lbs.	lbs.	lbs. oz.
Rosea cotton seed ...	192 0	4,245	2,900	7,337 0
Berar *jari* seed ...	5,067 0	100	414	5,581 0
Vera seed ...	1,020 0	...	..	1,020 0
Rosea cutchica seed ...	16 0	917	...	933 0
Malvensis seed ...	3,232 0	2,264	344	5,840 0
Buri seed ...	2,829 8	3,280	1,993	8,102 8
Bani seed ...	...	...	2,265	2,265 0
Cambodia seed ...	...	60	...	60 0
Lamkhansi juar ...	...	52	...	52 0
Saoner juar ...	2,819 0	828	959	4,606 0
Dhamna ...	56 8	...	...	56 8
Rambel ...	532 0	232	...	764 0
Chapti ...	968 8	629	...	1,597 8
Soybean ...	172 0	...	20	192 0
Groundnut ...	1,152 0	...	...	1,152 0
Tur ...	96 0	...	...	96 0
Grass seed ...	...	517	...	517 0
Total ...	18,152 8	13,124	8,895	40,171 8

STATEMENT B.—Showing distribution of copper sulphate and manures.

Name of manure.	Cultivators.	Seed farms and experimental farms.	Total.
	lbs. oz.		lbs. oz.
Copper sulphate ...	1,580 0	...	1,580 0
Sulphate of ammonia ...	293 12	...	293 12
Nitrate of soda ...	56 0	...	56 0

Statement showing the sale of Agricultural Implements from 1st July 1910 to 30th June 1911.

Month.	T. W. Plough C. T. 2.	T. W. Plough A. T.	T. W. Plough D. T.	Fodder-cutters.	Winnowers.	Akola hoe.	Hoshangabad. bakhars.	Nari plough.	Harrow.
July 1910.	2	...	...	...	...	6	1	...	...
August „ ...	...	...	...	...	...	2	...	...	...
September „ ...	...	...	...	...	...	3	...	1	...
October „ ...	3	...	...	...	...	...	...	...	...
November „ ...	9	...	...	...	...	11	...	1	...
December „ ...	17	...	...	...	1	...	...	...	...
January 1911.	24	...	...	1	...	...	...	...	...
February „ ...	36	...	...	2	...	...	...	...	...
March „ ...	11	10	...	1	1	10	4	...	...
April „ ...	12	4	1	...	...	2	3	...	1
May „ ...	5	...	...	...	...	2	2	...	...
June „ ...	5	...	...	...	...	...	...	...	...
Total ...	124	14	1	4	2	36	10	2	1

The sale of new implements has increased very considerably during the year in this division: 139 Ransome's turnwrest ploughs were sold as against 68 last year. Five leading members of the District Agricultural Associations have been appointed as honorary agents for these ploughs, so as to meet more effectively the present demand. The demand for A. T. ploughs came from cultivators who required a plough of lighter type for garden cultivation: some also have used it for uprooting cotton stalks before *bakharing*. The Hoshangabad *bakhar* is claimed to serve the same purpose, as it possesses a clean cutting blade, which goes to a greater depth than the local implement of that name.

The ploughing match held on the farm gave an incentive to the use of improved iron ploughs.

The new Akola hoe continues to be a favourite. Those who have tried it say that it is much superior to the *dũorá* for interculture.

This is the first year of the depôt: it promises to be a useful appendage to the farm. The prices of the implements sold were recovered without any trouble.

Trials of new implements and machines.

The Japanese hand gin, the Universal power gin supplied by Mr. Norman Pearse and a hand-gin of the same type supplied by the same gentleman were tried during the year. The two hand-gins were capable of cleaning only 100 lbs.

of *kapas* per day of 10 hours when working at their best. The Japanese hand-gin often gets out of order owing to the slender nature of its parts. None of the hand-gins yet tried have given satisfaction. They cost too much and the work done is too little. The Universal power gin requires less power than Platt's gin, but does the same amount of work. It does less damage to the seed than Platt's.

STATEMENT C.—Statement showing transactions with the Treasury from the 1st July 1910 to 30th June 1911.

Head.	1907-08.	1908-09.	1909-10.	1910-11.	Remarks.
Receipts.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Sale of Produce ...	3,088 1 3	4,836 14 8	11,562 6 5	9,769 7 5	
Distribution of Seeds ...	671 5 9	584 3 9	1,746 7 1	2,397 6 4	
Miscellaneous ...	48 3 9	760 14 3	391 11 0	349 0 9	
Total Receipts ...	3,807 10 9	6,182 0 8	13,700 8 6	12,515 14 6	
Expenditure.					
Establishment ..	7,013 9 10	6,776 13 5	6,940 8 3	6,730 11 0	
Travelling Allowance ...	640 14 3	585 12 0	486 5 6	68 3 0	
Total ...	7,654 8 1	7,362 9 5	7,426 13 9	6,798 14 0	
Purchase of Seed ...	81 2 5	390 7 6	21 8 0	14 10 9	
Farm Building ...	3,7791 8	79 14 0	5 9 9	34 6 6	
Constructions and Repairs of Roads and Irrigations.	...	959 7 3	7 11 6	...	
Purchase of Cattle and Implements ...	1,589 14 4	1,523 13 3	286 6 6	333 10 6	
Variable Labour ...	1,283 10 1	1,774 8 11	2,030 12 6	1,318 7 11	
Feed and Care of Cattle ...	472 15 3	1,377 2 3	983 10 9	601 2 3	
Manure ...	647 4 0	1,018 1 3	485 1 9	736 0 6	
Miscellaneous ...	680 4 3	863 6 3	945 11 3	*648 7 2	* Rs. 382-8-0 included as it was spared.
Postage and Telegrams ...	23 2 0	77 8 0	85 5 0	95 3 6	
Country Stationery ...	1 15 6	2 3 0	2 15 9	2 9 0	
Carriage of Stationery ...	16 11 0	21 1 0	15 8 0	6 9 0	
Conveyance of Forms ...	...	3 3 0	3 12 0	2 12 9	
Total ...	8,576 0 6	8,090 11 8	4,804 0 9	3,793 15 1	
GRAND TOTAL ...	16,230 8 7	15,453 5 1	12,230 14 6	10,592 13 1	

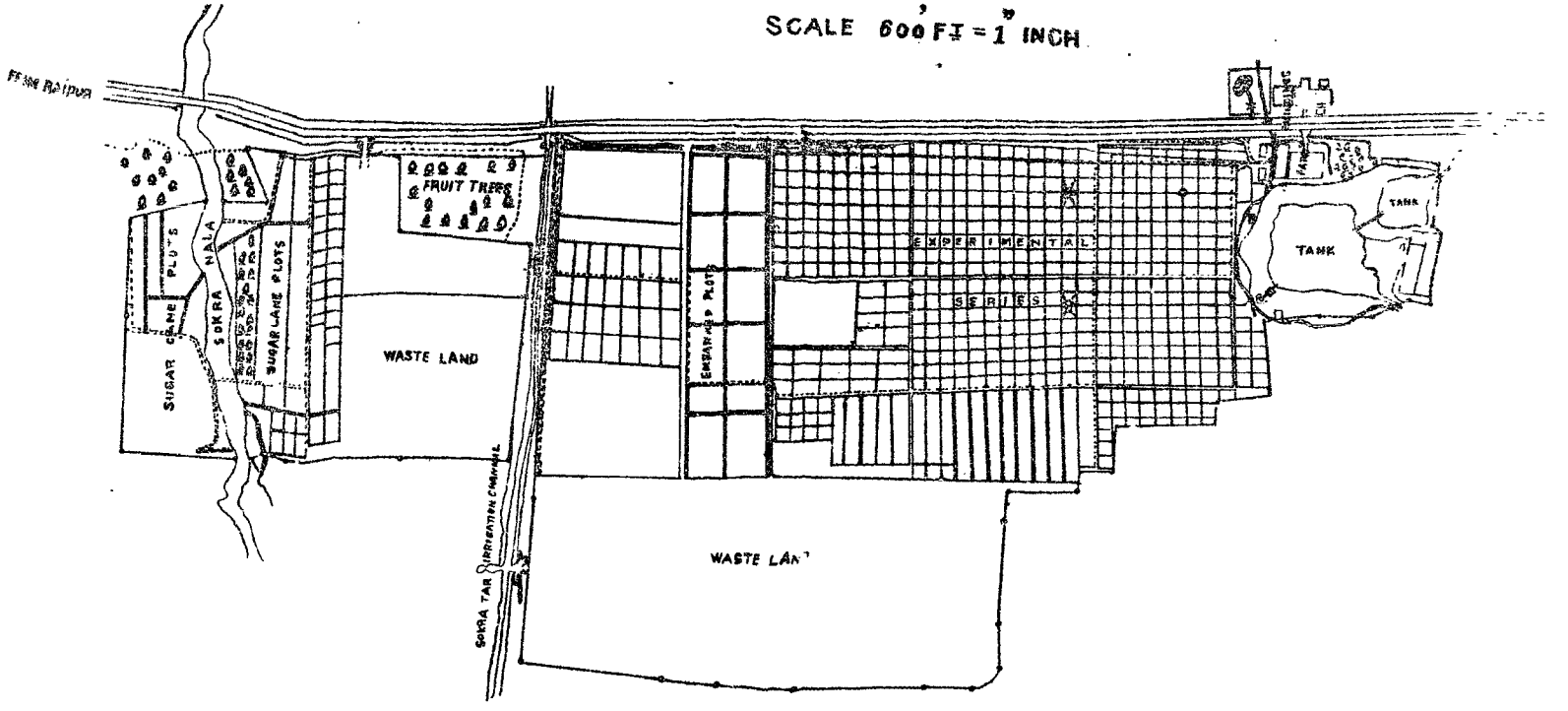
D. CLOUSTON,

Deputy Director of Agriculture.

GOVERNMENT EXPERIMENTAL FARM

AT LABHANDI, RAIPUR

SCALE 600 FT = 1 INCH



RAIPUR FARM.

The Raipur Agricultural Station occupies an area of 224 acres, of which 60 are under grazing. It lies on a gentle slope, which includes typical samples of *matasi*, *dorsa* and *kanhar* soils. The *matasi* area is reserved solely for rice, the *dorsa* for rice followed by pulses or wheat, and the *kanhar* for wheat and sugarcane. Analyses of these three classes of soil are given below :—

	Matasi.	*Dorsa.*	*Kanhar.*
Insoluble silicates and sand	87·41	74·68	69·73
Ferric oxide	4·18	6·71	7·64
Alumina...	4·78	11·43	13·83
Lime	0·28	0·85	1·05
Magnesia..	0·30	0·81	0·75
Potash	0·43	0·86	0·79
Soda	0·13	0·20	0·25
Phosphoric acid	0·02	0·02	0·02
Sulphuric acid	Very little.	...	...
Carbonic acid	0·13	0·09	0·08
Organic matter and combined water	2·40	4·35	5·86
Total ...	100·00	100·00	100·00
Total nitrogen	·053	·041	·036
Available phosphoric acid.	·001	·001	·001
Do. potash	·010	·011	·012

The farm occupies a central position in the most backward agricultural tract of these provinces. The methods of cultivation are primitive and the standard low. The staple *kharif* crops are rice, *kodon* and *kutki*, and the *rabi* crops wheat and oil-seeds. The area under rice alone in 1909-10 amounted to 3,150,803 acres, almost the whole of this area is sown broadcast (*biasi*). An organised attempt is being made to introduce the method of transplantation. The entire non-experimental area under rice on the Experimental Farm has been transplanted for the last three years, and transplantation was demonstrated in 357 villages last year. An effort has also been made to extend the cultivation of sugar-cane and ground-nut. The area under both is gradually but slowly increasing. The irrigation of wheat has also been recommended and demonstrated in villages under Government tanks for the last three years.

The want of trained men to carry out these new lines of work has been felt all along. A scheme was therefore initiated three years ago to train men in the new methods on the farm. With this aim in view three classes of men are being trained, *viz.*, (1) orphan boys, (2) *kamdars* and (3) private individuals connected with the land, including *havaldars* of Court of Wards Estates. Twenty-five *kamdars* have been sanctioned for employment under the department. Five of these were taken on and trained during the year under report. The men sent for practical training by private land-owners and Court of Wards estates come mostly to learn transplantation. Of the nine men who underwent training last year, one remained on the farm for one mouth only, two for two months, two for three months, one for four months, two for five months and one for six months. Two returned to the farm in January, when sugarcane was being planted. The training given is purely practical. Eight men have already joined this year; it is hoped that when the fame of this farm spreads abroad, men of this class will come in gradually increasing numbers for practical training in improved methods. The scheme is original, in so far as it provides a short course for men who wish to learn special pieces of work, and that they are trained at their own expense.

CHARACTER OF THE SEASON.

The following table shows the rainfall of the year under report registered on the farm :—

Months.		Days of rain.	Rainfall.
			Inches.
July	1st half	7	13·23
	2nd half	7	2·12
August	1st half	11	21·64
	2nd half	2	1·39
September	1st half	7	2·90
	2nd half	8	1·30
October	1st half	7	1·91
	2nd half	1	0·30
November	1st half	1	2·12
	2nd half	...	...
December	1st half	...	...
	2nd half	...	...
January	1st half	...	...
	2nd half	...	...
February	1st half	...	...
	2nd half	...	...
March	1st half	2	1·04
	2nd half	...	...
April	1st half	...	...
	2nd half	...	...
May	1st half	...	...
	2nd half	...	...
June	1st half	7	11·90
	2nd half	5	6·91
	Total	65	66·76

Rice was again a very good crop, despite the abnormally high rainfall of 66·76 inches against an average of 53·28 inches for the district. A fall of over 7 inches in the last half of June and of 13·23 inches in the 1st half of July, damaged the *biasi* plots, some of which had to be re-sown in the experimental area.

Much damage was done to the groundnut by such heavy and incessant rain before the crop had got well established. The outturn of ground-nut on the farm was in consequence very poor. The cane and fruit trees which were near the Sokra *nala* also suffered in early July owing to excessive rain and the consequent flooding of the *nala* and the adjoining fields. Transplanted rice did much better than that which was broadcasted by the *biasi* system, as will be gathered from a perusal of the results obtained from the different series of experiments in which the two methods are compared. The increase due to transplantation as compared with *biasi* was tested in 89 villages. The transplanted rice gave an increase of 556 lbs. per acre.

As the rainfall was both heavy and seasonable, the effect of irrigation on the Experimental Farm, where the rice bunds are high and compact and therefore capable of holding up water for some time, was not pronounced this year except in the case of late rice. In the cultivators fields on the other hand, where, as in Chhattisgarh, the bunds are low and much perforated by crabs, water escapes from the plot much more readily ; irrigation applied under these conditions was much more effective. Comparative measurements were made

of the outturns of irrigated and unirrigated late, medium and early broadcasted rice in 40 villages in Raipur and Drug by Agricultural Assistants working in co-operation with subordinates of the Irrigation Department, together with leading cultivators in the villages, who certified to the accuracy of the results obtained. The increase due to irrigation amounted to 515 lbs. for late and medium rice, and 316⅔ lbs. for early.

The groundnut crop was much damaged during the year by jackals. Large numbers come to the farm at the time of sowing and harvesting. They follow the lines of the sown crop, scratch up and eat very large numbers of nuts. When the blanks are dibbled in, they repeat their depredations. Curious to say the sugarcane in which a few of them shelter during the day has never been touched, though many varieties of soft toothsome cane are being grown.

A large divisional meeting of the Chhattisgarh Agricultural Associations attended by the Officiating Commissioner, the Director of Agriculture, the Deputy Commissioners of Raipur and Drug, an agent of the firm of Burn and Company, the Manager, Rajnandgaon Mills, the Forest Officer, Raipur, the Superintendent of Khairagarh State and others, was held on the farm on the 21st October. There were about 250 members and other leading landholders present. These were shown round the farm in the morning and the different lines of work in hand were explained to them. Burn and Company's ploughs and cane mills were shown at work. Orders for 98 ploughs, mostly of the Meston type, were received at the meeting and supplied later by that firm. In the afternoon a meeting was held in a *shamiana* pitched near the farm building at which papers on the improved methods which the Department is trying to introduce were read and discussed. Many cultivators present spoke in high terms of the new methods which they themselves had adopted in their villages. *Sanads* were granted to 13 landholders who have played an active part in practising and in pushing irrigation and transplantation in their villages. The farm was visited during the year by the Hon'ble the Chief Commissioner, the Commissioner of Chhattisgarh, the Chief Secretary to Government, the Deputy Commissioners of Drug and Raipur, the Superintendent of the Irrigation Department, the Imperial Cotton Specialist, the Imperial Economic Botanist, Manager, Rajnandgaon Cotton Mills, and several other officials. Cultivators came as usual in numbers to see the crops and machinery at work or to buy seed. The total number of visitors was 3,755.

SERIES A.—SUBJECT.—To test the effect of different methods of sowing rice without irrigation, and with a light dressing of farm-yard manure (20lbs. nitrogen per acre) with medium rice. Plots to be 0·10 acre. Each irrigation to be given only when necessary to prevent withering

Plot I.—Transplanted.

„ II.—*Biasi.*

CROP.—*Parewa.*

Plot No.	Outturn per acre.									
	Average for 5 years 1905—10.					For 1910-11.				
	Grain.	Straw.	Cost of cultivation.	Value of outturn.	Net profit.	Grain.	Straw.	Cost of cultivation.	Value of outturn.	Net profit.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	1,402	1,160	8 12 0	41 7 7	32 11 7	840	790	7 10 6	23 4 8	15 10 2
II ...	926	882	10 9 5	25 9 9	15 0 6	690	800	12 7 2	19 12 2	7 5 0

In series A-1, A-2, B-1, B-2, the *biasi* plots had to be re-sown, which added to the cost of cultivation this year. The average profit per acre due to transplantation for the previous five years amounted to over Rs. 17 per annum. The profit for the year under report fell to Rs. 8-5-2.

SERIES A-2.—SUBJECT.—To test the effect of different methods of sowing late rice without irrigation and with a light dressing of farmyard manure

(20lbs. nitrogen per acre) with late rice. Plots to be 0·10 acre each. Irrigation to be given only when necessary to prevent withering.

Plot I.—Transplanted.

,, II.—*Biasi.*

CROP.—*Gurmatia.*

Plot No.	Outturn per acre.									
	Average for two years, 1908—10.					For 1910-11.				
	Grain.	Straw.	Cost of cultivation.	Value of outturn.	Net profit.	Grain.	Straw.	Cost of cultivation.	Value of outturn.	Net profit.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	1,495	960	8 12 0	42 11 1	33 15 1	990	820	7 10 6	26 15 9	19 5 3
II ...	1,060	1,010	10 9 3	31 9 11	21 0 8	750	660	12 7 3	20 9 9	8 2 6

Transplantation as compared with broadcasting (*biasi*) of late rice in this series has given a profit of over Rs. 11 for the year, and an average profit of over Rs. 12 for the two preceding years.

SERIES B-1.—SUBJECT.—To test the effect of different methods of sowing rice with irrigation, and with a light dressing of farmyard manure (20lbs. nitrogen per acre) with medium rice. Plots to be 0·10 per acre.

Plot I.—Transplanted.

,, II.—*Biasi.*

CROP.—*Parewa.*

Plot No.	Outturn per acre.									
	Average for five years 1905—10.					For 1910-11.				
	Grain.	Straw.	Cost of cultivation.	Value of outturn.	Net profit.	Grain.	Straw.	Cost of cultivation.	Value of outturn.	Net profit.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	1,644	1,272	10 12 0	50 6 0	39 10 0	1,490	1,370	7 10 6	41 2 11	33 8 5
II ...	1,218	1,104	12 7 0	38 1 7	25 10 7	800	810	12 7 2	22 6 9	9 15 7

Owing to the heavy rainfall of the year no irrigation was given to this and other series carrying medium paddy. The profit due to transplantation for the year exceeded Rs. 23 and the profit for the previous five years Rs. 14.

SERIES B-2.—SUBJECT.—To test the effect of different methods of sowing rice with irrigation and with a light dressing of farmyard manure (20lbs. nitrogen per acre) with late rice. Plots to be 0·10 acre each.

Plot I.—Transplanted.

,, II.—*Biasi.*

CROP.—*Gurmatia.*

No. of plot.	Outturn per acre.									
	Average for two years.					For 1910-11.				
	Grain.	Straw.	Cost of cultivation.	Value of outturn.	Net profit.	Grain.	Straw.	Cost of cultivation.	Value of outturn.	Net profit.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	2,135	1,465	10 12 0	61 10 7	50 14 7	1,250	1,210	7 10 6	34 12 10	27 2 4
II ...	1,400	970	12 9 0	39 12 1	27 3 1	1,160	1,160	12 7 3	32 7 3	20 0 0

Late transplanted rice in this series gave a net profit of Rs. 7. per acre over *biasi*. It is interesting to note that in these four series taken together the percentage of grain to straw for this year was 109 per cent for transplanted rice and 99 per cent

for *biasi*; and that the percentages for the previous years of the experiment were 137 for transplanted rice and 116 for *biasi*. Transplanting clearly increases the percentage of grain to straw.

SERIES C-1.—SUBJECT.—To test the effect of different manures without irrigation upon transplanted rice. Plots to be 0·10 acre

Plot I.—Cattle-dung, 20lbs. nitrogen per acre.
" II.—Calcium cyanamide, 20lbs. nitrogen per acre as a top-dressing.
" III.—Bone dust, 20lbs. nitrogen per acre.
" IV.—Bone dust 10lbs. and saltpetre 10lbs. nitrogen per acre as a top-dressing.
" V.—Dried leaves of trees, 20lbs. nitrogen per acre.
" VI.—Tank silt, 640 mds. per acre.
" VII.—Castor cake, 20lbs. nitrogen per acre.
" VIII.—Manured with one year old poudrette, 20lbs. nitrogen per acre.
" IX.—Night-soil after Meagher system done in the month of April, every third year.
" X.—Bone dust, 10lbs. nitrogen and sulphate of ammonia 10lbs. nitrogen as a top-dressing.
" XI.—Unmanured.

CROP.—*Gurmatia paddy.*

Plot.	Average for five years.			Average value of increase due to manure for five years.	For 1910-11.			Profit due to manure.
	Grain.	Straw.	Value.		Grain.	Straw.	Value.	
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
I ...	1,596	1,256	44 0 9	23 6 8	1,240	1,010	33 11 8	22 1 9
II ...	930	902	29 6 11	8 12 10	930	1,060	26 8 12	3 0 9
III ...	1,792	1,818	57 4 0	36 9 11	1,480	1,350	40 13 10	15 7 11
IV ...	1,562	1,362	48 11 1	38 1 0	1,120	880	30 5 4	6 3 5
V ...	986	926	30 13 7	10 3 6	570	580	15 15 10	5 9 11
VI ...	1,208	1,106	37 13 7	17 3 6	890	880	24 13 8	13 3 9
VII ...	1,220	1,182	38 1 1	17 7 0	1,420	1,160	38 10 3	21 11 4
VIII ...	1,448	1,350	45 5 4	24 11 3	1,670	1,530	46 2 2	34 8 3
IX ...	2,156	2,520	69 3 10	48 9 9	1,620	1,650	45 7 9	33 3 3
X ..	950	932	29 14 8	9 4 7	1,200	1,060	32 15 10	11 3 1
XI ..	652	624	20 10 1	...	330	360	9 1 11	...

All the manures applied have added largely to the outturn. The large increase is partly due to the fact that the check plot is becoming impoverished by continuous cropping, while the manured plots are increasing in fertility owing to the accumulation of the residues of the manures applied. The two manures that have proved more profitable than cattle-dung are poudrette and night-soil, neither of which is used by the cultivators, despite the fact that it is easily obtainable in Raipur. Castor-cake, bone meal and tank silt have again given a good account of themselves.

SERIES C-2.—SUBJECT.—To test the effects of different manures without irrigation upon *biasi* rice. Plots to be ·10 acres.

Plot I.—Cattle-dung, 20lbs. nitrogen per acre.
" II.—Calcium cyanamide 20lbs. nitrogen per acre as a top-dressing.
" III.—Bone dust 20lbs. nitrogen per acre.
" IV.—Bone dust 10lbs. nitrogen and saltpetre 10lbs. nitrogen per acre as top-dressing.
" V.—Dried leaves of trees, 20lbs. nitrogen per acre.
" VI.—Tank silt, 640 mds. per acre.
" VII.—Castor cakes 20lbs. nitrogen per acre.
" VIII —Manured with one year old poudrette 20lbs. nitrogen per acre.
" IX.—Night-soil after Meagher system done in the month of April every third year.
" X.—Bone dust 10lbs. nitrogen and sulphate of ammonia 10lbs. nitrogen as a top-dressing.
" XI.—Unmanured.

No. of plot.	Average outturn for five years.			Average value of increase due to manure for five years.	Outturn for 1910-11.			Profit or loss due to manure.	
	Grain.	Straw.	Value.		Grain.	Straw.	Value.	Profit.	Loss.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I	1,068	1,000	32 5 8	24 4 0	1,100	1,187	31 2 2	22 12 5	...
II	796	868	26 0 0	17 14 4	600	1,030	18 9 3	...	1 10 9
III	1,182	1,180	36 7 8	28 6 0	1,240	1,130	34 3 8	12 1 11	...
IV	924	812	28 2 11	20 1 3	830	800	23 1 6	2 3 9	...
V	626	570	19 6 11	11 5 3	430	410	11 15 1	4 13 4	...
VI	926	866	29 0 6	20 14 10	690	730	19 7 6	11 1 9	...
VII	854	904	27 0 6	18 14 10	920	890	25 9 9	11 15 0	...
VIII	812	762	25 0 5	16 14 9	1,020	900	28 0 6	19 10 9	...
IX	1,152	1,486	36 7 4	28 5 8	970	980	27 2 10	18 3 1	...
X	430	532	13 7 9	5 6 1	920	1,910	26 2 9	7 10 10	...
XI	266	212	8 1 8	...	190	320	5 13 9	...	...

Bone-meal has given the largest increase in this series and cattle-dung the largest profit. Poudrette and night-soil have also done well. When the cost of the bone-meal is calculated at Rs. 4 per cwt., the value of the increase is Rs. 12-0-0. It is possible to manufacture this manure locally at a much cheaper rate, and steps are being taken to encourage the manufacture of bone-meal with that aim in view. Tank silt, dried leaves and castor cake have all proved profitable as manures for paddy.

SERIES C-3.—SUBJECT.—To test the effect of different manures with irrigation upon transplanted rice. Plots to be 0·10 acre.

I.—Cattle-dung 20 lbs. nitrogen per acre.
II.—Calcium cyanamide 20 lbs. nitrogen per acre as a top-dressing.
III.—Bone dust 20 lbs. nitrogen per acre.
IV.—Bone dust 10 lbs. and saltpetre 10 lbs. nitrogen per acre as a top-dressing.
V.—Dried leaves of trees 20 lbs. nitrogen per acre.
VI.—Tank silt 640 maunds per acre
VII.—Castor cake 20 lbs. nitrogen per acre.
VIII.—Manured with one year old poudrette 20 lbs. nitrogen per acre.
IX.—Night-soil after Meagher system done in the month of April every third year.
X.—Bone dust 10 lbs. nitrogen and sulphate of ammonia 10 lbs. nitrogen as a top-dressing.
XI.—Unmanured.

Outturn per acre.

Plot.	Average for two years.			Average increase due to manures for two years.	Cost of manure.	Increase due to manure, 1910-11.	For 1910-11.			Profit or loss due to manure.	
	Grain.	Straw.	Value.				Grain.	Straw.	Value.	Profit.	Loss.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I	1,060	1,045	31 6 0	17 2 8	2 8 0	6 7 1	700	620	19 4 0	3 15 1	.....
II	940	850	27 13 8	13 10 4	14 6 3	6 13 9	700	720	19 10 8	.....	7 8 6
II	1,285	1,030	37 7 0	23 3 8	16 4 0	16 2 5	1,057	907	28 15 4	.....	0 1 7
IV	965	885	28 9 4	14 6 0	15 0 0	13 3 9	960	765	26 0 8	.....	1 12 3
V	765	665	22 7 4	8 4 0	1 4 0	6 8 11	680	762	19 5 10	5 4 11	.....
VI	870	795	25 9 0	11 5 8	2 8 0	0 7 7	777	922	22 4 6	6 15 7	.....
VII	520	440	15 10 0	1 6 8	7 13 0	1 5 2	505	505	14 2 1	.....	6 7 10
VIII	1,255	1,050	36 9 4	22 6 0	2 8 0	19 0 8	1,062	1,575	31 13 7	16 8 8	.....
IX	2,165	2,050	64 9 8	50 6 4	3 2 0	25 15 1	1,400	1,300	38 12 0	22 13 1	.....
X	815	770	24 6 8	10 3 4	12 10 10	15 15 4	1,000	1,190	28 12 3	3 4 6	.....
XI	475	415	14 3 4	.....	.....	.....	430	617	12 12 11	.....	.....

The remarks made to series C-2 also apply to this series, except that bone-meal, though it has increased the yield by 627 lbs. of paddy, has failed to give a profit in plot No. III to which it was applied.

SERIES C-4.—SUBJECT.—To test the effect of different manures with irrigation upon *biasi* rice. Plots to be 1/10 acre.

I.—Cattle-dung 20 lbs. nitrogen per acre.

II.—Calcium cyanamide 20 lbs. nitrogen per acre as a top-dressing.

III.—Bone dust 20 lbs. nitrogen per acre.

IV.—Bone dust 10 lbs. saltpetre and 10 lbs. nitrogen per acre as a top-dressing.

V.—Dried leaves of trees 20 lbs. nitrogen per acre.

VI.—Tank silt 640 maunds per acre.

VII.—Castor cake 20 lbs. nitrogen per acre.

VIII.—Manured with one year old poudrette 20 lbs. nitrogen per acre.

IX.—Night-soil after Meagher system applied in the month of April every third year.

X.—Bone dust 10 lbs. nitrogen and sulphate of ammonia 10 lbs. nitrogen as a top-dressing.

XI.—Unmanured.

Outturn per acre.

No. of plot.	Average for two years, 1908–10.			Average value of increase due to manure	For 1910-11.			Profit or less due to manure.	
	Grain.	Straw.	Value.		Grain.	Straw.	Value.	Profit.	Loss.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I	780	750	23 2 0	14 11 8	700	800	20 0 0	7 6 5	.....
II	840	550	16 1 4	7 11 0	650	740	18 9 3	.....	5 14 7
III	1,000	910	29 4 8	20 14 4	1,010	880	24 12 3	.....	1 9 4
IV	720	705	21 10 4	13 4 0	862	1,837	28 2 0	3 0 5	.....
V	545	605	16 11 8	8 5 4	575	627	16 4 1	4 14 6	.....
VI	640	625	19 5 8	10 15 4	545	603	15 7 7	2 14 0	.....
VII	650	620	19 1 0	10 10 8	700	1,000	20 13 4	2 14 5	.....
VIII	900	765	25 9 4	18 3 0	720	790	20 6 10	7 13 3	.....
IX	1,775	1,765	52 15 8	44 9 4	1,250	1,100	34 5 6	21 1 11	.....
X	730	750	21 15 8	13 9 4	727	1,222	22 5 7	.....	0 6 10
XI	280	250	8 6 4	.....	355	395	10 1 7	.....	.....

Night-soil and bone-meal have given large increases in outturn, and night-soil much the highest profit.

SERIES F.—SUBJECT.—To test the effect of double-cropping after *biasi* rice without irrigation. All plots to be manured annually with cattle-dung (40 lbs. nitrogen per acre).

Each plot to be 0·10 acre.

I.—Rice to be followed by linseed drilled in after rice is reaped.

II.—Rice to be followed by linseed sown broadcast before rice is reaped.

III. } Same as above, substitute *teora* for linseed.
IV. }

V. } Same as above, substitute *urid* for linseed.
VI. }

VII. } Same as above, substitute gram for linseed.
VIII. }

Outturn per acre.

Plot.	Average of five years 1905—10.			Cost of cultivation per acre.	For 1910-11.		
	Grain.	Straw.	Value.		Grain.	Straw;	Value.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.
I { Paddy	502	468	15 6 9	20 6 8	360	640	11 3 9
I { Linseed	50	140	3 0 0		30	70	2 4 8
II { Paddy	494	480	15 1 5	11 5 8	300	510	9 4 3
II { Linseed	49	110	3 4 10		70	120	5 2 7
II { Paddy	622	592	19 0 0	20 6 8	470	740	14 4 6
II { *Teora*	105	265	4 9 6		50	150	2 4 8
IV { Paddy	786	744	24 5 9	11 15 8	520	740	15 7 5
IV { *Teora*	136	258	8 5 1		90	210	3 14 3
V { Paddy	548	586	17 5 10	20 6 8	350	810	11 11 4
V { *Urid*	160	320	6 0 0		80	170	3 6 0
VI { Paddy	470	502	14 10 8	11 15 8	255	255	7 2 2
VI { *Urid*	100	212	4 7 0		130	290	5 8 8
VII { Paddy	548	614	18 0 3	20 6 8	275	525	8 11 9
VII { Gram	312	572	13 6 8		230	250	6 12 8
VIII { Paddy	484	520	15 3 3	11 0 8	150	290	4 12 5
VIII { Gram	192	380	7 7 11		500	320	15 5 4

The soil of this series is also inferior *dorsa*; when the second crop is sown as *utera*, *i. e.*, before harvesting the paddy, there is still enough moisture in the soil to ensure germination; when the second crop is sown in the drill after the removal of previous crop, germination generally fails. Owing to the abnormal rainfall of the year under report, the germination was better than usual. *Utera* has given better results than drill sowing throughout, the cost of cultivation being less and the outturn obtained from the second crop higher.

SERIES N.—SUBJECT.—To ascertain the effect of irrigation on the second crop sown as *utera* and by drill in *matasi* soil; eight plots as in Series F. Plots to be manured annually with cattle-dung (40 lbs. nitrogen per acre).

I.—Rice to be followed by linseed sown by drill after rice is reaped.
II.—To be followed by linseed sown broadcast before rice is reaped.
III and IV.—To be followed by *teora* instead of linseed.
V and VI.—To be followed by *urid* instead of linseed.
VII and VIII.—To be followed by gram instead of linseed.

Outturn per acre.

Plot.	Average of two years 1908—10.			For 1910-11.		
	Grain.	Straw.	Value.	Grain.	Straw.	Value.
	lbs.	lbs.	Rs a. p.	lbs.	lbs.	Rs a. p.
I { Paddy	740	750	27 11 0	680	790	19 7 8
I { Linseed	...	...	...	20	40	1 5 4
II { Paddy	775	845	24 1 0	710	640	19 9 1
II { Linseed	50	130	3 13 2	40	60	2 14 8
III { Paddy	685	740	20 6 8	530	610	15 2 7
III { *Teora*	...	...	...	95	305	4 7 2
IV { Paddy	1,020	910	30 1 4	1,150	870	31 0 1
IV { *Teora*	145	260	7 12 10	100	170	4 0 8
V { Paddy	780	765	23 2 0	690	690	19 4 10
V { *Urid*	...	...	...	80	100	3 1 4
VI { Paddy	830	775	24 13 4	690	820	19 13 6
VI { *Urid*	70	185	3 10 8	120	150	4 10 0
VII { Paddy	560	625	17 3 4	580	720	16 12 11
VII { Gram	130	150	3 14 9	230	240	6 12 0
VIII { Paddy	670	700	20 1 4	600	810	17 10 7
VIII { Gram	120	150	3 10 4	250	260	7 5 4

The second crop sown broadcast before the harvesting of the paddy crop (*utera*) has done better than drilling in the seed in this series also. Gram has proved to be the best second crop to grow after rice.

SERIES O.—SUBJECT.—To ascertain the effect of irrigation on second crop sown as *utera* and by drill in *dorsa* soil, eight plots as in Series F. Plots to be manured annually with cattle-dung (40 lbs. nitrogen per acre).

I.—To be followed by linseed sown by drill after rice is reaped.

II.—To be followed by linseed sown broadcast before rice is reaped.

III and IV.—To be followed by *teora* instead of linseed.

V and VI.—To be followed by *urid* instead of linseed.

VII and VIII.—To be followed by gram instead of linseed.

Outturn per acre.

Plots.		Average for two years 1908—10.			For 1910-11.		
		Grain.	Straw.	Value.	Grain.	Straw.	Value.
		lbs.	lbs.	Rs. a. p.	lbs.	lbs.	Rs. a. p.
I	Paddy	840	815	24 13 8	680	650	18 14 4
	Linseed	...	...	...	60	100	4 6 10
II	Paddy	520	445	14 5 8	380	320	10 6 2
	Linseed	70	135	5 2 2	100	180	7 6 8
III	Paddy	495	565	14 12 8	285	535	9 0 3
	Teora	...	...	...	65	265	3 4 4
IV	Poddy	320	335	9 14 0	270	247	7 7 4
	Teora	185	395	9 14 6	110	190	4 7 4
V	Paddy	315	370	9 12 0	150	265	4 10 9
	Urid	...	...	...	70	110	2 12 8
VI	Paddy	435	365	12 10 8	315	345	8 15 0
	Urid	75	185	3 14 10	110	200	4 8 0
VII	Paddy	445	430	13 0 4	260	440	8 0 4
	Gram	120	130	3 9 8	320	280	9 2 8
VIII	Paddy	610	575	18 1 8	495	685	14 10 3
	Gram	140	150	4 3 3	330	350	9 11 4

The second crop when sown broadcast (*utera*) has done better in every case. Gram is the best second crop to grow, but the soil of this and the preceding two series is poor *dorsa* and not at all suitable for double-cropping.

SERIES P.—SUBJECT.—To compare the effects of cattle manure and of *san* used as a green manure for transplanted rice: the cattle manure of plots 1 and 2 to be applied every 4th year at the rate of 80 maunds per acre. Plots to be 0·10 acre each.

Plot 1.—Cattle manure 80 maunds per acre.

„ 2.—*San* hemp and 80 maunds cattle manure.

„ 3.—*Nil.*

„ 4.—*San* hemp.

„ 5.—*Nil.*

Plot 6.—*San* hemp.
" 7.—*Nil.*
" 8.—*San* hemp.

No. of plot.	Treatment.	Date of ploughing in *san* hemp.	Date of transplanting paddy.	Outturn per acre in lbs.	Increase due to green manure in lbs.
1	Cattle manure ...	...	8th August 1910 ...	1,960	
2	*San* and cattle manure ...	27th July 1910 ...	Do. ..	2,990	1,030
3	*Nil.* ...	...	Do. ..	840	
4	*San* ...	27th July 1910 .	Do. ...	1,340	500
5	*Nil.* ...	...	12th August ...	520	
6	*San* ...	4th August ...	Do. ...	1,100	580
7	*Nil.* ...	...	Do. ...	500	
8	*San* ...	4th August 1910 ...	Do. ...	1,290	790

San hemp proved to be effective and economical as a manure for rice, both when used by itself and with cattle-dung. The *san* was ploughed in when about 18 inches high.

SERIES R.—SUBJECT.—To test the effect of different methods of transplanting paddy without manure. Plots to be 1/10 of an acre each.

I.—Single seedlings per hole 6 inches apart.
II.—Two seedlings per hole "
III.—Three seedlings per hole "
IV.—Bunches "

Outturn per acre.

Plot	1910-11. Grain.	Straw.	Value.	Cost of cultivation.	Net profit.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	2,540	3,020	73 0 11	3 15 4	69 1 7
II .	2,190	1,750	59 6 11	4 4 4	55 2 7
III ...	2,270	3,170	67 4 1	4 9 4	62 10 9
IV ...	1,460	3,040	47 6 10	5 3 4	42 3 6

The seed-rate for single seedlings is about 15 lbs. per acre and for bunches as practised in the Wainganga Valley from 90 to 100 lbs. There is therefore a considerable saving of seed when 'singles' are transplanted, and the outturn too is higher. On the other hand, the 'bunch method' of transplanting requires rather less time.

SERIES D.—SUBJECT.—To test effect of different methods of tillage on *rabi* crops without manure. Plot to be 0·20 acre.

Plot I.—*Bakhared.*
" II.—Ploughed with country plough.
" III.— " by Ransome's turnwrest plough.

CROP.—*Wheat and gram to be rotated.*

Plot	Outturn per acre. Avarage for five years 1905 to 1910. Grain.	Straw.	Value.	Cost of cultivation.	For 1910-11. Grain.	Straw.	Value.
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	Rs. a. p.
I { Gram	903	978	29 5 2	7 11 4	200	195	7 15 3
I { Wheat	602	797					
II { Gram	1,087	1,110	35 1 6	7 13 0	215	235	8 10 2
II { Wheat	642	705					
III { G am	1,102	1,075	35 0 2	9 7 3	235	295	9 9 11
III { Wheat	645	695					

These plots were sown before the November rain of last year and suffered in consequence. The outturn for the previous five years speak in favour of ploughing in preference to *bakharing*; but the work can be done more economically by the country plough than by a heavy English plough.

SERIES E.—SUBJECT.—To test the effect of different manures on wheat with irrigation. Plot to be 0·10 each.

I.—Manured with night-soil after Meagher system in April.

II.—One year old poudrette 30 lbs. nitrogen per acre.

III.—Farm-yard manure 30 lbs. nitrogen per acre.

IV.—Bone-dust 30 lbs. nitrogen per acre.

V.— Do. 15 lbs. do. do. and saltpetre 15 lbs. nitrogen per acre applied as a top-dressing.

VI.—Castor cake 30 lbs. nitrogen per acre.

VII.—Saltpetre 30 lbs. nitrogen per acre in two top-dressings.

VIII.—Saltpetre top-dressing 20 lbs. nitrogen per acre.

IX.—Green manure with *San*-hemp 100 head-loads per acre.

X.—Green manure with such weeds as are available.

XI.—Tank-silt 640 maunds per acre.

XII.—Unmanured but irrigated.

XIII.— Do. and unirrigated.

CROP.—*Wheat.*

Plots.	Average for 2 years 1908—10.			Average increase due to manure for 2 years.	Average increase due to manure and irrigation.	Cost of manure.	For 1910-11.			Increase due to manure for 1910-11.	Profit or loss due to manure.	
	Grain.	Straw.	Value.				Grain.	Straw.	Value.		Profit.	Loss.
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I	1,170	1,115	56 1 2	28 10 6	33 11 10	4 11 0	890	810	35 2 7	14 13 10	10 2 10	...
II	995	885	48 1 6	20 10 10	25 12 1	3 12 0	820	930	32 2 7	11 13 10	8 1 10	...
III	700	580	33 9 4	6 2 8	11 4 0	3 12 0	510	460	20 2 1	—0 2 8	...	3 14 8
IV	860	825	41 10 2	13 3 6	19 4 10	22 8 0	510	470	20 2 10	—0 1 11	...	22 9 11
V	1,135	1,150	55 2 0	27 11 4	32 12 8	22 8 0	750	830	30 3 11	9 15 2	...	12 8 10
VI	875	850	42 10 4	15 3 8	20 5 0	11 11 6	780	750	30 15 8	10 10 11	...	1 0 7
VII	790	790	38 7 8	11 1 0	16 2 4	28 10 0	720	750	28 13 5	8 8 8	...	20 1 4
VIII	930	930	44 14 11	17 8 3	22 9 7	19 2 5	660	670	26 5 9	6 1 0	...	13 1 5
IX	660	665	31 12 2	4 5 6	9 6 10	8 4 0	250	270	10 0 10	—10 3 11	...	18 7 11
X	625	605	30 3 6	2 12 10	7 14 2	7 8 0	470	520	18 15 3	—1 5 6	...	8 13 6
XI	645	920	31 8 0	4 1 4	9 2 8	3 12 0	590	530	23 4 5	2 15 8	...	0 12 4
XII	575	560	27 6 8	...	...	...	510	500	20 4 9	...	...	...
XIII	460	600	22 5 4	...	...	...	300	360	12 2 5	...	...	...

The only manures that have given a profit are night-soil and poudrette. The outturns of the different plots of this series are comparatively low, the soil being rather light, 2nd class *dorsa*. The plots too are well bunded and remain very wet during the rains. Manuring with *san* hemp under these conditions does harm rather than good, as the physical texture of the soil is injured at the time of applying this green manure in September. An increase of 210 lbs. of grain and 140 lbs. straw was due to irrigation alone.

SERIES E-2.—*Subject.*—To test the manurial value of calcium nitrate for irrigated wheat.

I.—Calcium nitrate 30 lbs. nitrogen per acre.
II.—Unmanured.
III.—Calcium nitrate 30 lbs. nitrogen per acre.
IV.—Unmanured.
V.—Calcium nitrate 15 lbs. nitrogen per acre.
VI.—Unmanured.
VII.—Calcium nitrate 15 lbs. nitrogen per acre.
VIII.—Unmanured.

Plots.	Outturn per acre 1910-11.			Cost of manure.	Loss from manuring.
	Grain.	Straw.	Value.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ..	900	900	35 14 3	21 9 0	13 6 9
II ...	700	660	27 12 0	...	...
III ...	1,010	1,000	40 3 10	21 9 0	10 7 4
IV ...	740	650	29 2 2	...	...
V ...	900	820	35 8 11	10 12 6	1 11 9
VI ...	670	620	26 8 2	...	...
VII ...	940	980	37 10 5	10 12 6	2 12 3
VIII ...	740	790	29 10 2	...	...

Calcium nitrate has given a substantial increase in the yield in every case, but in no case does the value of the increase cover the cost of the manure.

SERIES Q.—SUBJECT.—To ascertain the outturns of different varieties of groundnut followed by wheat grown as a second crop under irrigation. Plots to be 0·10 of an acre.

Manured with poudrette (40 lbs. nitrogen per acre annually).

Plots.		Outturn per acre.						Value of both crops.
		Average for two years 1908 to 1910.			For 1910-11.			
		Grain.	Straw.	Value.	Grain.	Straw.	Value.	
		Lbs.	Lbs.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
I	Virginia ...	1,475	...	109 10 6	900	...	56 4 0	92 7 4
	Wheat ...	540	710	26 4 0	910	890	36 3 4	
II	Big Japanese ...	1,600	...	118 1 5	470	...	29 6 0	53 11 3
	Wheat ...	490	760	23 13 8	610	610	24 5 3	
III	Pondicherry ...	1,575	...	119 7 5	910	...	56 14 0	76 7 8
	Wheat ...	670	980	32 7 11	500	420	19 9 8	
IV	Madras ...	1,920	...	144 12 6	1,636	...	64 12 0	79 0 4
	Wheat ...	680	740	32 7 2	360	340	14 4 4	
V	Mozambique ...	1,670	...	128 10 7	780	...	48 12 0	84 14 3
	Wheat ...	710	720	28 12 4	900	960	36 2 3	
VI	Local ...	2,400	..	174 0 0	1,370	...	85 10 0	116 6 0
	Wheat ...	490	660	23 10 4	770	780	30 12 0	

Owing to the heavy rainfall of June and July, the germination of groundnut was defective and it suffered later from water-logging. The outturn was poor. Raipur local again gave the highest yield. Irrigated wheat can be grown quite successfully after ground-nut. The rotation is a most promising one for irrigated tracts. The wheat was irrigated three times.

Q 2.—*Subject.*—To compare the relative outturns of different varieties of wheat grown on (i) irrigated and (ii) unirrigated land. Plots to be 0·25 of an acre.

Name of variety.	Irrigated.		Unirrigated.		Valuation of wheat per cwt. by Messrs. Ralli Brothers & Co., Bombay.	Irrigated.			Unirrigated.			Remarks.
	Grain.	Straw.	Grain.	Straw.		Value of grain.	Value of straw.	Total.	Value of grain.	Value of straw.	Total.	
	Lbs.	Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Pusa No. 4 ...	782	828	714	727	4 14 0	34 0 7	3 7 2	37 7 9	31 1 3	3 0 6	34 1 9	
Pusa No. 6-A ...	941	966	741	750	4 12 0	39 14 6	4 0 5	43 14 11	31 6 10	3 2 0	34 8 10	
Pusa No. 7 ...	928	964	716	732	4 9 0	37 12 10	4 0 3	41 13 1	29 2 9	3 0 10	32 3 7	
Poona, Nagpur Muzafarnagar.	884	920	712	708	4 11 0	36 15 11	3 13 4	40 13 3	29 12 9	2 15 2	32 11 11	
Poona *Hansia* of Broach.	892	932	612	596	4 7 0	35 5 6	3 14 2	39 3 8	24 3 11	2 7 9	26 11 8	
Lal Kesarwali Chatti.	848	900	652	644	4 8 0	34 1 2	3 12 0	37 13 2	26 3 2	2 10 11	28 14 1	
Poona Australlian $22\frac{36}{38}$.	824	868	560	556	4 12 0	34 15 2	3 9 10	38 9 0	23 12 0	2 5 1	26 1 1	
Raipur *Kathia* ...	764	812	696	700	4 3 6	28 12 5	3 6 2	32 2 7	26 3 6	2 14 8	29 2 2	
Hoshangabad Mundi *Pissi.*	864	868	544	560	4 12 0	36 10 3	3 9 10	40 4 1	23 1 2	2 5 4	25 6 6	
Hoshangabad white *Pissi.*	804	860	660	672	4 13 6	34 12 4	3 9 4	38 5 8	28 8 8	2 13 10	31 5 6	
Raipur red *Pissi* ...	816	876	696	692	4 12 0	34 9 9	3 10 5	38 4 2	29 8 4	2 14 2	32 6 6	
Nagpur *Haura* ...	672	704	612	640	4 13 0	28 14 0	2 14 11	31 12 11	26 4 9	2 10 8	28 15 5	
Lyalpur ...	604	644	672	680	4 11 0	25 4 6	2 10 11	27 15 5	28 2 0	2 13 4	30 15 4	

All the three selected Pusa varieties are very promising wheats for unirrigated land. Nos. 4 and 6-A were the earliest of all the varieties grown. They were ready for harvesting more than a fortnight earlier than any of the other varieties under trial. No. 4 gave large plump grain, but the straw was slightly weak and broke down to some extent when the soil cracked in February; the grain was the best of all the varieties under trial. Next to it for quality came white *pissi*, one of the three selected varieties obtained from the Hoshangabad farm, while Raipur *kathia*, which is one of the local wheats, was poorest of all. Pusa Nos. 6-A and 7 gave the best yields under irrigation.

The plots were irrigated twice, the average increase due to irrigation was 107 lbs. of grain and 191 lbs. of straw; as the plots were even and have not been manured for the last eight years at least, these figures give a fairly reliable indication as to the value of irrigation for wheat grown on black soil.

SERIES O.—SUBJECT.—To test the value of different manures for sugarcane plots.

Plots 0·10 acre each.

Plot I.—Cattle-dung 200 lbs. nitrogen per acre.

„ II.—Poudrette do.

„ III.—Castor cake. do.

„ IV.—Bone dust. do.

„ V.—Ammonium sulphate do.

„ VI.—Cattle dung 100 lbs. nitrogen and ammonium sulphate 100 lbs. Nitrogen applied as a top-dressing.

„ VII.—Urine earth 200 lbs. nitrogen per acre.

Serial No. of plots.	Weight of cane per acre in lbs.	Yield of gur per acre in lbs.	Cost of manure.	Cost of cultivation including seed Rs. 40 and water rate Rs. 10 per acre.	Cost of gur making.	Total cost.	Value of gur at 10 lbs. per rupee.	Net profit or loss per acre.	
								Profit.	Loss.
			Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	23,280	2,074	25 0 0	98 2 0	6 7 8	129 9 8	207 6 4	77 12 8	...
II ...	24,330	2,168	25 0 0	98 2 0	6 12 5	129 14 5	216 12 10	86 14 5	...
III ...	32,710	2,915	78 3 0	98 2 0	9 0 9	185 5 9	291 8 0	106 2 3	...
IV ...	20,410	1,819	162 8 0	98 2 0	5 10 11	266 4 11	181 14 4	...	84 6 7
V ...	31,390	2,798	91 0 8	98 2 0	8 11 10	197 14 6	279 12 10	81 14 4	...
VI ...	22,420	1,998	58 0 4	98 2 0	6 3 10	162 6 2	199 12 10	37 6 8	...
VII ...	9,460	843	25 0 0	98 2 0	2 10 1	125 12 1	84 4 10	...	41 7 5

As this was the first year of this experiment no deductions of any value can yet be drawn from the results obtained.

Varieties of Crops.

Rice.—Of the exotic varieties of rice received from Japan, Ceylon, Madras and British Guiana none did well with the exception of Berbice and Berbice Creole from British Guiana. All but these two have therefore been dropped.

A varietal series of 27 different rices, including those obtained from the Economic Botanist and the varieties selected on the farm, has been started this year. They have been classified as late, medium and early. The outturns and relative values of the grain will be compared with the view of deciding on the varieties to be grown for selection, propagation and distribution.

The selection of *gurmatia, parewa chinur, raskadam* and *Nasik* rice is being continued. The whole area under *gurmatia* has been sown with selected Nos. 9, 12, 14, 16 and 19. These were compared with ordinary *gurmatia* in a field experiment this year and yielded 24, 24, 13, 18 and 39 per cent re-spectively more grain and 10, 33, 4, 9 and 9 per cent more straw than the ordinary rice of the check plot.

Cotton.—*Buri* and *Cambodia* cotton were tried; but owing to excessive rain and consequent water-logging in the *kanhar* soil, in which they were grown, their yields were only 226¼ and 217 lbs. per acre, respectively, worth Rs. 34-10-0 and Rs. 33-5-0.

Cassava.—4,100 cassava cuttings were supplied for seed.

Sugarcane.—One new variety of cane, *viz.*, B. 208, of which seed was kindly supplied by the Director of Agriculture, Madras, was added to those under trial. It did rather poorly; but is being tried again this year. There were 13 other varieties under trial. There has so far been very little disease in the canes grown on the farm. *Pundia* is the only variety that has been attacked to an appreciable extent. Stem-borer (*chilosimplex*) continues to do a considerable amount of damage every year to cane when planted late, the thick varieties suffer most, and green Mauritius most of all. The best varieties for ratooning are *sannabille* and *bansi*, two hard thin varieties, the seed of which came originally from Poona.

Soy-bean.—Soy-bean was tried for the first time on the farm and gave an outturn of 217 lbs. per acre, which would have been much higher had the rainfall been less.

Egyptian clover (Berseem).—Trifolium Alexandrinum was grown on the farm as a *rabi* crop in *dorsa* soil and did very well. Two cuttings were taken, of which the cattle were allowed to graze the after-growth. The crop was slightly affected by dodder, as in the case of that grown on Telinkheri Farm.

Wheat.—Thirteen varieties were tested in plots of one-fourth acre each, both on irrigated and unirrigated lands, with the view of ascertaining the most suitable variety for distribution in this division. The three selected Pusa varieties received from the Imperial Economic Botanist, Nos. 4, 6-A, and 7, are very promising varieties for this tract. Selected *mundi pissi*, white *pissi*, Raipur red *pissi*, obtained from Hoshangabad farm also did well. Samples of all these wheats were

sent to Ralli Brothers, Bombay, who valued Pusa No. 4, as being the best of all. Their valuation is given below :—

Serial No.	Name of variety.	Characteristics.	Valuation per cwt.
			Rs. a. p.
1	Punjab Lal Kesarwala ...	Soft, white, containing a good deal of glossy and some red.	4 8 0
2	Pusa No. 7 ...	Do. do.	4 9 0
3	Layallpur ...	Soft, white, very nice quality of the channel canal wheat.	4 11 0
4	Pusa No. 4 ...	Soft, white, bold and plump containing a good deal of glossy.	4 14 0
5	Poona, Nagpur Mozaffernagar.	Nice, well fed, soft, white wheat having rather the characteristic of Indore *pissi*; it would fetch a higher price if it contained less red grains.	4 11 0
6	Pusa No. 6-A ...	Nice, soft, white ...	4 12 0
7	Hoshangabad *mundi* ...	Nice, white, *mundi* ...	4 12 0
8	Poona Australian ...	Well fed; it contains a good deal of glossy ...	4 12 0
9	Hoshangabad *pissi* ...	Well fed soft white *pissi* ...	4 13 6
10	Raipur *pissi* ...	Well fed red *mundi*, rather soft ...	4 12 0
11	Raipur *kathia* ...	Well fed hard red wheat; it would fetch a higher price if it contained less soft and *mesquine* grains.	4 3 6
12	Poona *hansia* of Brooach ...	Hard yellow, well fed, but containing a high percentage of *mesquines* and soft grains.	4 7 0
13	Nagpur *haura* ...	Hard yellow small grains and containing a much smaller percentage of *mesquines* and soft grains than the sample preceding.	4 13 0

IMPLEMENT DEPÔT.

The demand for implements in this division is increasing. It was therefore decided to start a depôt on the farm in the year under report. The chief demand was for light iron ploughs of the Meston and Watts type. Of these 110 in all were supplied. The services of the farm smith were utilized in several cases in setting up or repairing the machines or implements supplied. The winnowers were supplied from Nagpur Farm Depôt. A list of the implements sold is given below :—

Name of machines or implement.	For Government Officers.	For private persons.	Demonstration purposes and members of Agricultural Association.	Total.
	No.	No.	No.	No.
Meston's plough ...	2	106	2	110
Chain pump ...	...	6	...	6
Sugarcane mills ...	1	5	...	6
Total ...	3	117	2	122

Statement showing the rates used for valuing the produce and manures for 1910-11.

Name of crop, etc.	Rate.	Name of crop, etc.	Rate.	Remarks.
Paddy ...	42 lbs. per rupee.	Teora straw ...	24 lbs. per rupee.	...
Do. straw ...	240 lbs. do.	*Gur* ...	10 lbs. do.	...
Groundnut ...	16 lbs. do.	Cattle-dung ...	1 cart-load do.	...
Wheat ...	28 lbs. do.	Poudrette ...	1 do. per Re. 0-12-0	...
Do. straw ...	240 lbs. do.	Calcium nitrate ...	Rs. 9-8 0 per cwt.	...
Gram ...	40 lbs. do.	Ammonium sulphate ...	,, 13-0-0 do.	...
Do. straw ...	240 lbs. do.	Bone-meal ...	,, 4-0-0 do.	...
Urid ...	30 lbs. do.	Castor cake ...	,, 2-0-0 per maund.	...
Do. straw ...	240 lbs. do.	Calcium cyanamide ...	,, 12-0-0 per cwt.	...
Teora ...	30 lbs. do.	Urine earth ...	,, 25 for one acre of sugarcane	...

Statement showing the total area under cultivation.

Crop.	Area.	Total.	Grand Total.
	Acres.	Acres.	Acres.
Experimental Kharif.			
Rice alone ...	9·60		
Rice and linseed ...	·60		
Rice and *teora* ...	·60		
Rice and *urid* ...	·60		
Rice and gram ...	·60		
Groundnut and wheat ...	·60		
		12·60	
Rabi.			
Wheat alone ...	2·70		
Wheat and gram ...	·60		
Gram alone ...	·20		
Wheat in irrigation experiments ...	3·60		
Wheat in varietal experiment ...	6·60		
Wheat under manurial experiments ...	1·60		
Sugarcane ...	·70		
		16·00	28·60
Non-experimental Kharif.			
Rice alone ...	31·85		
Rice and German peas ...	·25		
Rice and berseem ...	·20		
Groundnut ...	20·00		
Soy-bean ...	2·50		
San-hemp ...	8·00		
Cotton ...	1·25		
		64·05	
Rabi.			
Wheat alone ...	20·5		
Gram alone ...	10·20		
Sugarcane ...	10·00		
Flax ...	·10		
		40·8	104·85
Sugarcane Fallow ...	·80		·80
			134·25

Statement showing the Expenditure and Receipts for the year 1910-11.

Head of receipts.	Average of five years.	Actual.	1910-11.		Total.
			To be realised.	Cost of seed supplied to demonstration farms.	
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Receipts.					
Sale-proceeds of farm produce ...	7,286 9 5	4,869 1 4	2,680 8 0	1,888 1 11	9,437 11 3
Other receipts ...	4,274 8 2	...	...	...	...
Cost of fodder ...	464 9 11	600 0 0	...	...	600 0 0
Total ...	12,025 11 6	5,469 1 4	2,680 8 0	1,888 1 11	10,037 11 3

Expenditure.	Average of 5 years.	Actual expenditure for 1910-11.
	Rs. a. p.	Rs. a. p.
Charges.		
Establishment pay ...	4,509 13 9	2,684 2 3
Travelling allowance ...	229 10 4	194 7 6
Total ...	4,739 8 1	2,878 9 9
Supplies and Services.		
Seed grain ...	135 8 3	291 5 0
Building and roads ...	607 6 5	38 7 0
Purchase of cattle and implement ...	310 15 0	206 14 0
Feed and care of cattle ...	730 2 9	849 8 8
Variable labour ...	887 12 8	3,763 10 0
Manure ...	302 1 5	580 9 4
Other miscellaneous ...	2,193 8 10	1,884 4 3
Purchase of land ...	1,100 0 0	...
Purchase of materials of chain-pump. ...	1,153 11 6	...
Total ...	7,421 2 10	7,614 10 3
Contingencies.		
Postage charges ...	480 3 0	119 6 0
Telegram charges ...	8 0 9	1 1 6
Country stationary ...	1 12 6	4 4 0
Total ...	58 0 3	124 11 6
GRAND TOTAL ...	12,218 11 2	10,617 15 6

Statement showing the seeds supplied to Government Officers, Private Persons and Demonstration Farms.

Name of seeds.	Government officers.	Other private persons.	Demonstration farms and members of Agricultural Associations.	Total.	Remarks.
	lbs.	lbs.	lbs.	lbs.	
San hemp	120	90	3,892	4,102	
Groundnut	760	896	7,162	8,818	
Ratkadam paddy	150	...	648	798	
Chinnor ,, ...	...	88	336	424	
Nasik ,, ...	60	...	...	60	
Safeda	80	...	124	204	
Gurmatia	...	...	11,657	11,817	
Buri cotton seed	...	230	150	380	
Bangla sugarcane	...	...	1,375	1,375	
Pundia	...	200	5,839	6,039	
Pounda	...	4,670	...	4,670	
Red Mauritius	...	4,190	8,430	12,620	
Ashy Mauritius	...	...	5	5	
Striped Mauritius	...	...	105	105	
Sanabile	...	4,190	33,144	37,334	
Lanji	...	...	2,895	2,895	
Tanna	...	...	9	9	
Cassava cuttings	4,100	...	...	4,100	

D. CLOUSTON,

Deputy Director of Agriculture.

TELINKHERI SEED FARM.

The total area comprised in this farm at present is 74·77 acres. An area of 21·20 acres lying beyond the Telinkheri Tank, which was sown last year with fodder crops, has this year been set aside for pasture, and part of it has been sown with grass seeds, wild lucerne, and a few other legumes, with the view of establishing a pasture for the cattle of the breeding farm. This leaves only 53·57 acres under cultivation. Considerable attention has been given to the question of fodder crops during the year. *San* hemp, soy-beans, *ringni juar*, silage made from the coarser grasses, clover and wild lucerne have all been tried. *San* hemp is a bulky fodder; but experiment proved that when cut at the time of flowering, the cattle ate only 60 per cent of it, the harder parts of the stalk being left. Soy-bean as a fodder is very palatable, but the small outturn of about 3,000 lbs. obtained per acre condemns it as a fodder. *Ringni juar* does fairly well, but being grown as a *rabi* crop beyond the tank, it is much damaged by wild pigs. Egyptian clover and wild lucerne have proved to be distinctly promising fodders. The former was grown in an area of one acre as a second crop after rice and yielded 6½ tons of luscious clover. When sown in November it gives, if irrigated after each cutting, four cuttings before the 1st of May. The want of irrigation facilities made it impossible to continue the crop after that time. There was a great demand for it in the Civil Station of Nagpur as a green fodder for horses: from December till February on an average 30 bundles each weighing 5 lbs. in weight were sold daily. Part of the fourth cut ing was made into clover hay which was greedily eaten by the farm cattle. The difficulty to be faced in introducing this as a fodder crop lies in the fact that, while it grows more luxuriantly out here than in the West it gives a much smaller outturn of seed. The yield obtained per acre this year only amounted to 60 lbs., which is just about the seed-rate. The crop was attacked with dodder in the beginning of the season. This parasite was evidently introduced through the seed and is entirely new to this part of the world. It was dug out with *khurpis* after the first cutting and did not again make its appearance.

2. An experiment was tried with the view of ascertaining whether this parasite is liable to attack gram and *tur*: the result indicates that it does not, but this requires to be verified. A note by the Economic Botanist on the subject of this dodder attack is given as an appendix to this report. Wild lucerne did well, but gives much less bulk of green fodder than clover. It is, however, hardier, seeds freely, and sows itself. It was fed to the cattle of the two farms. An attempt is being made this year, as suggested by the Director of Agriculture, to establish a permanent pasture of the best grasses mixed with these legumes. With irrigation it will be possible to maintain a good pasture throughout the year.

3. Feeding experiments were carried out during the year under report to ascertain the relative feeding values of *mahua* refuse, cotton seed and *tur* husk. The nutritive values of *kushli* grass (*Andropogon contortos*) from Nawagaon reserve in Raipur and of *guner* (*Anthistiria ciliata*) and *mushel* grass (*Iseilema laxum*) from Raigarh, as compared with the best grasses, *i. e.*, *shera* (*Ischoemum laxum*) growing on Telinkheri hill and with the mixed grasses grown on the same hill, were also tested.

Raipur *kushli* grass proved the least palatable of all grasses tried. *Mushel* grass from Raigarh was found to be better than the best grass, *i. e.*, *shera* from the hill. The two Raigarh grasses, *viz.*, *mushel* and *guner*, were sent for experiment by the Deputy Commissioner, Balaghat.

This feeding experiment was carried on for one month only. Each animal was given 10 lbs. of grass as dry hay each night, in addition to the scanty grazing which it had during the day. At the end of the month they had increased in weight as shown below:—

Bullock No.	Kind of grass.	Increase in weight in lbs.
1 ...	*Mushel*	16
2 ...	*Shera*	7
3 ...	*Guner*	8
4 ...	Mixed grasses from Telinkheri ...	11

When *tur* husk was fed by itself, its food value proved to be a negative quantity. *Mahua* refuse, cotton seed and *kardi* were also tried : four lbs. of *kardi* cake fed daily gave better results than same quantity of cotton seed, but this finding requires to be verified.

The feeding value of *mahua* at the rate of 12 lbs. per day proved inferior to both *kardi* and cotton seed. Crude molassine *gur* was also used on the farm for a time : at first the cattle refused to touch it, but when melted in warm water and mixed with *juar*, it was eaten greedily.

4. Twenty three varieties of paddy received from the Economic Botanist were grown on the farm : the best of these are being grown on a large scale this year.

5 Jute gave as usual a very good outturn.

6. Of the varieties of sugarcane tried, *khari* cane from Bengal did best. As a ratoon crop it is a most promising variety.

7. *Cotton*.—A large number of crosses were again produced between selected *bani* No. III and the different selected types of *jari*. The cross between *bani* and *rosea* is the most promising, as the former excels in the quality of its lint and the latter in its high ginning percentage.

Plant to plant selection of cotton was continued. The old selected strains now being grown on a field scale gave the percentages of lint to seed shown below:—

	Percentage of lint.
Buri No. II	33·00
Bani No. 3	28·90
Malvensis No 3	30·50
Rosea No. 1	40·00
„ No. 2	39·45
„ No. 4	38·90
„ No. 5	39·47
Vera	34·78
Rosea cutchica	37·80

The mixed quality of the so-called *jari* cotton grown in these Provinces has been referred to in the report on the Akola farm. Seed obtained from all the cotton-growing districts has been grown on the Nagpur and Telinkheri Farms. The tabular statement on next page shows how greatly the composition of the mixture varies in the case of different districts.

It is interesting to note that in Berar, as a whole, the coarser types greatly predominate, while, in the Central Provinces generally, there are higher percentages of the longer stapled types.

The classification of samples of jari cotton collected from the cotton-growing districts of the Provinces is shown below :—

CENTRAL PROVINCES.

No. of samples classified.	Name of the district.	Percentage of *malvensis*	Percentage of *vera*.	Percentage of *rosea*	Percentage of *cutchica*.	Percentage of *bani*.	Percentage of upland georgian.	Name of cotton.
2	Nimar—							
	S. 1 ...	64	19	5	2	10	..	Harsud No. 1.
	S 2 ..	38	57	5	...	...	...	Do. No. 2.
1	Chanda—							
	S. 1 ...	...	17	46	12	25	...	Chanda *katevilayti*.
4	Yeotmal ...							
	S. 1 ...	3	23	55	19	...	...	Yeotmal.
	S. 2 ...	4	3	35	58	...	...	Pusad.
	S. 3 ...	45	32	4	...	12	7	Kelapur.
	...	21	15	23	28	...	13	Chanda *katevilayti*

No. of samples classified.	Name of the district.	Percentage of *malvensis*.	Percentage of *vera*.	Percentage of *rosea*.	Percentage of *cutchica*.	Percentage of *bani*.	Percentage of upland georgian.	Name of cotton.
3	Akola—							
	S. 1 ...	7	44	...	...	...	49	*Ghogli* cotton.
	S. 2 ...	6	..	58	21	...	15	Balapur *jari*.
	S. 3 ...	15	14	..	...	71	...	Risod *bani*.
6	Buldana—							
	S. 1 ...	4	1	45	36	...	14	Malkapur *gaorani*.
	S. 2 ...	35	20	36	9	...	...	Do. *kateli*.
	S. 3 ...	48	8	26	15	....	3	Do. *hauri*.
	S. 4 ...	19	59	23	4	...	2	Khamgaon cotton.
	S. 5 ...	35	15	32	9	4	5	Do. *gaorani*.
	S. 6 ...	2	21	12	27	2	35	*Gaorani*.
2	Amraoti—							
	S. 1 ...	45	21	6	9	...	19	Murtizapur.
	S. 2 ...	16	16	59	7	...	12	Ellichpur.
2	Jubbulpore—							
	S. 1 ..	9	91	...	...	...	...	
	S. 2 ..	3	93	4	...	...	...	
3	Seoni—							
	S. 1 ...	30	39	11	11	...	...	
	S 2 ...	38	24	38	...	...	..	
	S 3 ...	7	24	42	20	...	7	
7	Hoshangabad—							
	S. 1 ...	40	55	5	...	...	...	*Ratia* Seoni Malw.
	S. 2 ..	33	67	...	..	...	...	*ratia* A.
	S. 3 ...	72	14	7	2	5	...	Do. *ratia* B.
	S. 4 ...	30	56	...	10	4	..	
	S. 5 ...	16	75	...	...	2	7	Sohagpur.
	S 6 ...	39	28	18	13	...	2	Harda-*deshi*.
	S. 7 ...	66	30	...	...	4	...	Hawa Bhopali.
1	Chhindwara—							
	S. 1 ...	30	10	40	14	..	6	Sausar cotton.
1	Betul—							
	S. 1 ...	2	10	61	8	...	19	

REPORT ON THE NAGPUR IMPLEMENT DEPOT.

The sale of implements at this depôt has fallen away considerably since the establishment of Akola, Hoshangabad and Raipur depôts. The demand during the year was chiefly for ploughs and winnowers; but most of the former are required for Berar and are now supplied from Akola, while Hoshangabad caters for the supply of winnowers, most of which are required for the Hoshangabad and Jubbulpore Divisions. This is as it should be. The winnowers supplied by the Nagpur depot mostly go to Chhattisgarh.

Statement showing the sale of agricultural implements from the Nagpur Implement Depôt during the year ending 30th June 1911.

Name of implement	Number supplied to			
	District and other Government officers.	Private persons.	Demonstration and Experimental Farms.	Total.
Turnwrest plough ...	1	12	1	14
Winnower ...	1	11	...	12
Smalley fodder-cutter ...	1	3	...	4
Wolverine feed-cutter ...	1	...	...	1
Lever-cutter ...	...	1	...	1
Belgaum fodder cutter ...	...	1	...	1
Bullock gear ...	5	6	1	12
Corn-sheller ...	...	2	...	2
Hand-thresher ...	1	...	...	1
Sugarcane mill ...	...	2	...	2
Bakhar ...	...	1	...	1
Dundia ...	...	1	...	1
Daura ...	...	1	...	1
Total ...	10	41	2	53

D. CLOUSTON,
Deputy Director of Agriculture.

In February of this year my attention was called to the occurrence of dodder on the Telinkheri farm. The parasite was growing in plots of Egyptian clover (*Trifolium Alexandrinum, Lin*) and was easily distinguished through the rosy colour of the stem. Specimens were sent to Calcutta for identification and were determined as *Cuscuta Chinensis, Lamk.*

The clover seed was from Sind and an analysis of the seed gave 32 per cent of impurity. Most of this impurity was simply earth, but about 10 per cent was of seeds of Cichorium Intybus, Linn. The dodder did not confine itself to the clover, but spread to a slight extent on to *Melilotus alba, Lamk*, which was growing in the vicinity. In pot cultures during the hot weather the chicory plants were attacked by the parasite after the clover had been killed.

The means taken by the farm staff to combat the disease were to cut the infested patches out and destroy the cuttings. This seemed to check the spread and the new growth of clover was free from disease. The danger in this treatment lay in the fact that any portion of the dodder escaping cutting and destruction was an almost certain centre of re-infection. The occurrence of the parasite was reported to the Deputy Director of Agriculture, Sind, and his reply was to the effect that frequent cuttings would prevent the spread of the dodder. This practice, though undoubtedly a very risky one, answered well enough at Telinkheri. Obviously the safest course is to get seed free from dodder; unless a guarantee can be had to this effect, seed should be refused. Further, seed showing as high a percentage of impurity as the present sample is far from satisfactory.

R. J. D. GRAHAM,

Economic Botanist,

Central Provinces.

Report of the Agricultural Chemist for the year ending June 30th, 1911.

The assistant staff remains two in number, as it was thought impossible to add to the strength of this branch while the demand for demonstration and other out-door assistants remain so acute. The College courses in Chemistry and Physics have, on the experience of the last few years, now been definitely laid down, and laboratory handbooks for students, with notes of lecture courses for assistants, have been compiled. Evidence that the Chemistry course is satisfactory is found in the fact that the Imperial Agricultural Chemist again asked for a passed student of the College to fill an Assistant Chemist's post at Pusa.

During the year a scheme has been drawn up for carrying out analytical work of an agricultural nature free for *bona fide* agriculturists and at a small charge for other private persons and public bodies. Although so far only a little demand has been made for assistance of this nature, and that from public bodies, it is hoped that with an increased number of agricultural assistants able to appreciate and explain the value of such work, more use will be made of the facilities provided.

During the year eighty-three samples have been sent in for analysis, chiefly from Deputy Directors and the Experimental Farms. The materials examined were as follows :—

Sewage, drainage and other waters				...	8
Oil-seeds and cakes		...		...	43
Manures	...	...		...	17
Cereals	...	...		...	12
Ghi	...	...		...	2
Boiler scale	...	...		...	1
			Total	...	83

In the course of the above work the following items of interest were observed, in addition to others, to be dealt with by the officers for whom the analysis was made :—

The Soy bean, cultivated for many years on all the farms of the Department, contains a very low proportion of oil and cannot be regarded as an oil yielder.

Fish-manure of high manurial value is imported into Nagpur and sold for fruit and other garden cultivation at a price frequently above its intrinsic value.

Much variation is shown in the quality of oil-cakes produced by the various classes of mills and presses working in these Provinces, the products from power mills even showing great differences in value as cattle-foods.

A detailed study of the composition of soils used for embankments has been made and figures obtained showing the physical composition of these soils and the way in which they silt up. It is felt that laboratory examination must now be followed by field work, especially dealing with the water-holding power of the various types of soil concerned.

The salts found in the salt wells of the Purna valley in Berar have been investigated and the results communicated to the Sanitary Commissioner, as the question of the supply of potable water in the district concerned is of some difficulty, apart from the injurious effect of the water when used for irrigation.

No tours have been made during the past year.

F. J. PLYMEN,

Agricultural Chemist,

Central Provinces.

Report of the Economic Botanist, Central Provinces, for 1910-11.

Scientific work.

Special attention was given to rices, *juar* and capsicum, while cotton, *san* hemp, *bajra* (Pennisetum typhodium) and a number of Cucurbitas were grown under observation.

Rice.

569 varieties of rice collected in these Provinces were grown in pure cultures on the Nagpur Farm. Of these 48 were handed over to the Deputy Director of Agriculture, Southern Circle, for trial on a large scale. Of the fifteen varieties handed over in 1909-10, eight were kept for further trial on a more extensive scale. One of the four varieties sent to Deputy Director of Agriculture, Northern Circle, Hoshangabad, has still been continued for trial on a larger scale. Under 100 varieties are now under observation on the Nagpur Farm. The decrease in numbers under field observation shows that, to a large extent, the survey of the rices of the Province has been completed and material will shortly be available for a note on the rices. The number of Herbarium specimens numbers 1,287; this includes specimens received from the districts and a duplicate specimen grown on the local farm.

Juar.

Of the sixteen vatieties handed over to the Principal, Agricultural College, in 1909-10, two were kept for experiment on a larger scale. Two more juars were found to be splitting. Of the four varieties found to have split in 1909-10, all have been proved to be crosses. Further investigations are being continued. The survey of the *juars* has been completed, but the characters are so complicated that it will be some time before anything can be published on this subject.

The Madras varieties all did well and have now been handed over to the Principal, Agricultural College.

Capsicum.

The classificatien of the varieties of Capsicum was not published last year. The diagnoses have been confirmed. Three of the best varieties were given to local cultivators and to the Superintendent, Cantonment Garden, Jubbulpore.

San hemp.

Further investigations of the distinguished characters were undertaken. This work appears likely to be of only scientific value.

Bajra.

Some of the types have now been isolated. A local variety from Hoshangabad called *Marwari bajra* is very promising, and next year the seeds will be sufficient for distribution.

Cucurbitas.

The collection of the various kinds has been continued. Special attention has been given to water melons. Seeds of some varieties were obtained from the Superintendent, Government Gardens, Lucknow. The work on water melons was carried out at Nagpur, on the Tawa river, Hoshangabad, and by Dhimars at Gwarighat, Jubbulpore, on the Nerbudda. The points to be ascertained are keeping quality and flavour. The cultivators were eager to secure seed of the better types. The work of separating out the varieties of all the species under observations continues.

Herbarium.

The work continues on the same lines as in former years. The specimens collected now number 2,409. This includes a large number of specimens from Balaghat district, and a named collection of Berar grasses received from Mr. D. O. Witt, Deputy Conservator of Forests, Saugor.

The list of local weeds has been published and has been largely bought by the students. It is hoped to undertake the publication of similar lists for one of the other farms, as soon as sufficient matter is collected.

Mycology.

No important outbreak of disease was reported during the year. The work consisted in the collected specimens, which from time to time are sent to Pusa for identification.

Other work.

The Botanical Garden is now thoroughly established, and the value for teaching work can hardly be over-estimated. A number of visitors have taken an interest in the garden.

The most important additions have been a number of ferns from Balaghat, and crotons and dracænas from Poona.

A bamboo-house has been erected, and in it the collection of named crotons and dracænas, kindly sent by Mr. E. Little, Superintendent, Government House Gardens, Bombay Presidency, Poona, are doing well. It has been thought better to make a collection of ferns found in the Province, rather than make a poor collection of Indian ferns.

An experiment in colour selection in Zinnias has been successful.

A number of penny packets of seed from Ryder & Son were obtained last cold weather. These have enabled several additions to be made to the beds.

Miscellaneous.

A number of requests for seeds were complied with during the year. A consignment of *san* hemp seeds were sent to Mr. H. P. Hector, Economic Botanist, Eastern Bengal and Assam, and a parcel of *nim* seeds was despatched to Africa, to the Director of Agriculture, Gold Coast Colony, Northern Territories, and Ashanti. Requests for information on various subjects were dealt with. One request on the poisonous properties of Cleistanthus collins enableb a short note to be submitted to the Agricultural Journal.

Tours.

During the year the only tours made were to the Farms, all of which were visited once. In January the United Provinces Agricultural Conference was attended. The Assistant Botanist made two visits to the north of the Province in connection with his work on the Cucurbitas.

The decrease in the number of tours corresponds to the increase of work in Nagpur. The increase during the year was phenomenal.

Establishment.

One addition was made during the year. Mr. S. C. Roy, a passed student of the College, has been selected for the post of Field Assistant. The increase in the number of crops grown under observation made this appointment an absolute necessity.

The work was distributed amongst the staff as in former year.

R. J. D. GRAHAM,

Economic Botanist,

Central Provinces.

POWARKHERA CATTLE-BREEDING FARM.

The herd is now in a satisfactory condition and as a result of the stringent measures enforced three years ago and careful selection since, the quality of the animals, in the herd, has much improved.

Considerable difficulty was experienced in getting rid of old cows at a profit. This year an auction sale was held at the time of the Divisional Agricultural Meeting on the Farm.

Twelve cows, which were discarded on account of age, were disposed of. They were sold in calf or with calf at foot. Little difficulty is experienced in finding purchasers at good prices, if old cows are sold in this way, as intending purchasers have the opportunity of inspecting the cow's former progeny and the bull by which she is in calf. Bulls of the best type for breeding purposes will not be available for sale until next year. Nine bulls of fair quality, including two old bulls, were sold at prices varying from Rs. 80 to Rs. 60, and a number of orders have already been registered for bulls as they become available, which indicates an increased demand.

Two calves at foot died from infantile diarrhœa, and one was disposed of on the advice of the Superintendent, Civil Veterinary Department, as it was suffering from some constitutional disease. Otherwise the herd was remarkably free from disease, with the exception of a slight outbreak of foot and mouth disease. Fodder and water during the year were sufficient, the crop of hay being exceptionally good.

Statement showing the casualties in the Cattle-Breeding Farm from 1st July 1910 to 30th June 1911.

Description.	Balance on 1st July 1910.	Receipts.		Total.	Issues.			Total.	Balance on 30th June 1911.	Remarks.
		Births.	By transfer.		Deaths.	Sale.	Transfer to other heads.			
Cows ...	29	...	3	32	...	12	...	12	20	
Cow calves at foot ...	15	12	...	27	...	5	14	19	8	
Bull calves at foot ...	11	9	...	20	2	1	13	16	4	
Heifers ...	5	...	14	19	...	...	3	3	16	
Bulls ...	14	...	13	27	1	9	...	10	17	
Total ...	74	21	30	125	3	27	30	60	65	

Statement showing the receipts and expenditure of Cattle-Breeding Farm, Powarkhera, for the financial year 1910-11.

Heads.	Amount.	Total.
Receipts.	Rs. a. p.	Rs. a. p.
Sale of animals	564 0 0	
Sale of produce	216 8 9	
Other heads	3 4 0	783 12 9
Expenditure.		
Feed and care of cattle	1,402 5 11	
Buildings and fencing	1 3 0	
Purchase of stock (cattle)	..	
Employees paid from—		
Contingent grant	93 9 10	
Miscellaneous	522 8 0	2,019 10 9

G. EVANS,
Deputy Director of Agriculture,
Northern Circle, Central Provinces,
Hoshangabad.

TELINKHERI CATTLE-BREEDING FARM.

Much care and attention has been given to the management of the herd during the year with good results. The herd remained healthy throughout the period under report and there was a good demand for the animals offered for sale: 8 cows, 3 heifers, 20 bulls and 4 bullocks were disposed of. Nine of these were sold at an auction sale held on the farm in October. The average prices paid were Rs. 40 for cows, Rs. 29 for heifers, Rs. 92-8-0 for bullocks and Rs. 132 for bulls. It is satisfactory to know that for bulls the average price realised has risen by Rs. 26 since last year, that it is about Rs. 40 above the market value of bullocks of the same size, and that the highest price paid for a bull this year, *viz.*, Rs. 175, was Rs. 25 higher than the price paid for the best bull sold last year.

2. By a rigid system of selection, which involves the casting of all inferior types, the quality of the herd has been greatly improved. The defects that still show themselves are a tendency to legginess and want of bone. A small percentage of the calves are still born with cream coloured noses, eyebrows and hoofs, to which the cultivator applies the term *ganga*. This peculiarity is supposed to indicate weakness of constitution and softness of hoof. The defect is distinctly hereditary and like others can only be eradicated from the herd by exercising great care in the selection of both dam and sire; for 'like begets like.' By the system of selection followed on the farm we hope to get more bone, body and strength, without sacrificing beauty of form. The ordinary landowner who comes to purchase a bull invariably refuses to buy a *ganga* bull, condemns others possessed of unlucky markings intelligible only to the superstitious eye, but passes over most of the other defects of bone and muscle to which we attach far greater importance.

3. The area under the farm has been reduced by nearly one-half, about 300 acres having been handed over to the Forest Department for afforestation. The grasses over the whole area vary considerably in quality, but are mostly coarse in type. Silo pits were filled with spear grass and *san* hemp on the 1st of October with the view of ascertaining how far good silage could be made from these. When opened in April, the grass silage was found to be damaged round the edges only and was liked by the cattle. In the *san* hemp, however, fermentation had gone on to such an extent that it proved quite unpalatable.

4. This farm is growing in popularity. No trouble was experienced this year in getting rid of the bulls, despite the fact that the prices fixed were much higher than their value if castrated. The names of purchasers and the prices paid were published in the March number of the Agricultural Gazette.

5. The expenditure on the farm for the year amounted to Rs. 3,740 and the receipts to Rs. 5,559, leaving a profit of Rs. 1,819.

D. CLOUSTON,

Deputy Director of Agriculture.

Comparative Statement.

	Bulls in herd.	Cows.	Male calves.	Female calves.	Total.
31st March 1910	1	41	50	33	125
31st March 1911	1	40	36	31	108
Difference ...	...	1	14	2	17

Valuation Statement of Cattle, Grain and Fodder in hand at the close of the year 1910-11.

No. or quantity.		Description.	Rate.	Value.	Remarks, if any.
No.	Quantity				
			Rs.	Rs.	
1	...	Bull	80	80	
40	...	Cows	50	2,000	
5	...	Male stock above 2 years ...	150	750	
10	...	Do. castrated ...	75	750	
...	...	Do. 2 years old ...	...	...	
8	...	Do. 1 year old ...	50	400	
13	...	Do. Calves ...	25	325	
9	...	Female stock above 2 years ...	35	315	
2	...	Do. 2 years old ...	30	60	
8	...	Do. 1 year old ...	20	160	
12	...	Do. Calves ...	15	180	
				5,020	
	1,307,250 *poolas.*	Hay in stock	Rs. 2 per 1,000 *poolas.*	2,614	
		Concentrated food in stock ...		923	
				3,537	
		Grand Total ...		8,557	

D. CLOUSTON,

Deputy Director of Agriculture.

TABLE XI.—*Showing main results of the working of Telinkheri Cattle-Breeding Farm during the year ending 31st March 1911.*

Province.	Name of farm.	Receipts.				Expenditure.						Valuation of stock grain and fodder remaining in hand at the close of the year.				Remarks, if any.
		Sale of animals.	Sale of produce.	Other heads.	Total.	Salaries establishment.	Feed and keep of animals.	Cultivation expenses.	Purchase of animals.	Other heads.	Total.	Cattle.	Grain.	Fodder.	Total.	
		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs.	Rs.	Rs.	Rs.	
Central Provinces.	Cattle-Breeding Farm ...	535 0 0	...	1,024 0 0	5,559 0 0	559 0 0	3,129 9 0	...	...	113 0 0	3,801 9 0	5,020	923	2,614	8,557	

D. CLOUSTON,

Deputy Director of Agriculture,

Central Provinces.

The report on the working of the Nawagaon Fodder Reserve and on the Feeding Experiment conducted thereon.

This reserve is 12 miles from Raipur. It is divided nto two nearly equal halves by the Arang road. The total area of the reserve is 493·96 acres ; with the exception of a small area of a few acres of *dorsa;* the soil is *bhata*, The reserve as a whole is fairly representative of the type of *bhata* plain which is characteristic of the Raipur district. It was acquired by the Government with the object of retaining it as a fodder reserve for the cultivators of the surrounding villages, and it was placed under the management of the Raipur District Council.

The procedure adopted by the District Council was to auction the grass. The purchaser used to cut it in the cold weather, *i. e*, between December to February, and to sell it for thatching purposes. Not a single *pula* was ever fed to cattle, as the neighbouring cultivators are of the opinion that their animals will not eat the *sukla* grass (*Andropogon contortus*) which grows in the reserve when made into hay, and that it would injure them if they did. Mr. Standen gave this matter his personal attention, when Director of Agriculture 3 years ago, and found that the object of the Government in acquiring the reserve had been lost sight of.

It was proposed at first to improve the fodder value of the reserve by establishing one or more of the better grasses. Plots were prepared with considerable difficulty in the *bhata* soil by ploughing and *bakharing* and the seed of *mushel* (*Iseilema laxum*) locally known as *dadhera, kel* (*Andropogon pertusus*), *sheora* (*Alysicarpus monilifer*), a leguminous weed, and *paonia* (*Setaria glauca*), were sown in the beginning of the rains. A heavy rain, followed by a rather long break, left the *bhata* soil of the plots in a hard brick-like state, which checked the growth of these more delicate grasses entirely, and they finally died off. The experiment was tried again last year with a greater measure of success. *Mothi marvel* (*Andropogon caricosus*) a variety which had not been tried before, did well : it is not one of our best grasses, but it is better than *sukla.*

In obedience to Government orders the District Council made over the charge of it to this department in June 1910. Over 90 per cent of the whole area carries spear grass, known locally as *sukla* and as *kushli* grass in other districts. If not cut before the spears have formed, this grass is unpalatable as a fodder ; the stiff spears seem to injure the lips and tongues of the animals. If cut before those spears had time to mature, the grass is a fairly good fodder. *Sukla* is a slow maturing grass and the spears are not fully developed till the end of November.

It was intended to get all the area intended for hay cut by mowing machines before the end of October, if possible. Two mowers were employed—one by McCormick, and one by Harrison MacGregor and Company. The latter mower was purchased specially for this purpose and proved a very useful machine. One with a 4′ knife bar was selected to ensure lightness of draught. Mowing was started in the last week of September and was continued till the middle of November. The mowing of grass was delayed owing to the necessity of removing by hand the larger *tendu* bushes (Diospyros melanoxylon) which could not be cut by the machines. It will be possible this year to complete the work in October. The grass cut during the first two days was stored in the silo pit. The rest was made into hay in Western fashion. This necessitated the making of hay rakes and of short and long hay-forks. The rake used did its work so admirably that I can recommend its use in India where the bottom is moderately level. It consists essentially of a rectangular bar of wood set with wooden teeth 18″ long and 8″ apart. The rake may be of any length from 6′ to 10′. An ordinary *mistry* can make one in a day, at a cost of Rs. 3. The teeth are slightly tapered upwards at the end to prevent their entering the ground. It is drawn with ease when full of hay by a pair of weak bullocks. To empty it the driver raises it by the handles till the teeth are at right angles to the ground and then lifts it out of the gathered hay. The hay was collected in this way and made into cocks two days after cutting ; the forks required for cocking ; the hay was also made at the farm. The cocks were shaped to run the water and were not at all damaged.

by the rainfall of October. Now that labour is getting so scarce, it is impossible to deal satisfactorily with large areas of this grass, when it is in season, without adopting some such measures. The grass on about three-fourths of the area was cut and made into hay in this fashion and was built into 5 large stacks later. These stacks were reckoned to contain 8 tons of hay each. The remainder, with the exception of an area of about 30 acres kept for grazing, was cut later by hand for thatching purposes.

A meeting of the cultivators of the surrounding villages was held on the reserve on the 22nd of March. Mr. Tundilal, the Superintendent of the Raipur Farm, and the Tahsildar, Raipur, who was also present, explained to the people the object which the Government had in view, the method which had been adopted in making the hay and its use as a cattle food, as proved by the fact that the 10 young cattle, which were there for inspection, were being fed on it and were in good condition.

To induce neighbouring cultivators to buy the hay, it was offered at Rs. 2 per cartload. 267 thousand *pulas* of thatching grass were sold at from Rs. 2 to Rs. 2-8-0 per 1,000 *pulas*. 51 cart-loads of hay were sold to cultivators, 22 cart-loads to the residents of Raipur, and 68 cartloads were supplied for the use of the Raipur Farm. In all 141 cart-loads of the hay were used as fodder in addition to that consumed by the 10 young cattle.

The cutting and stacking charges, including the depreciation on machinery pay of *chowkidar*, etc., amounted to Rs. 359-7-9, and the value of the thatching grass and hay, including that supplied to the Raipur Farm, to Rs. 866-8-3. A profit and loss statement is shown in detail below :—

Receipts.	Rs.	a.	p.
Thatching grass	573	8	3
Hay	293	0	0
Total ...	866	8	3

Expenditure.	Rs.	a.	p.
Chowkidar	45	0	0
Mowing and cutting charges ...	191	4	3
Making and stacking ...	99	3	6
Depreciation on machinery ...	24	0	0
Total ...	359	7	9
Profit ...	507	0	6

For the present, at least, the neighbouring cultivators are prepared to pay much more for *sukla* grass cut for thatching purposes than for the same grass cut for hay earlier in the season by a machine which reduces its value as a thatching grass to *nil*.

The reserve has been let to the contractors for the last three years who have paid the following rents to the District Council for it :—

	Rs.
1906-07	300
1907-08	450
1908-09	470

The Department has this year succeeded in working the reserve at a greater profit, even after supplying the wants of the 10 cattle under experiment. It has succeeded, too, in convincing many of the surrounding cultivators that *sukla* grass is a fairly good fodder, and that the hardy breed of cattle of this tract can be successfully reared on such grass, when the hay portion of their diet consists of *sukla* cut before it is dead ripe, supplemented in the hot weather by a small allowance of ensilage made from the same grass.

D. CLOUSTON,

Deputy Director of Agriculture.

NAWAGAON FEEDING EXPERIMENT.

This experiment was the outcome of a conference held at Raipur in August 1909 to consider ways and means of improving the Chhattisgarhi breed of cattle. It was decided to ascertain to what extent better feeding will improve these cattle, as it is generally supposed that their inferiority is at least partially due to the practice prevalent in Chhattisgarh of keeping large herds without making any adequate provision for their food supply. From December till June their grazing grounds get barer and barer and the cattle generally lose flesh. By the time the rains break, they have become emaciated in appearance and are subject to cold chills, which account for many deaths in some years. In the absence of stall feeding the young stock are literally starved from December till the end of June, and their growth is no doubt thereby checked to some extent. In the feeding experiment under report steps were taken to avoid this by judicious stall feeding with hay and ensilage when there was not sufficient grazing. The ensilage and hay were both made from *sukla* or spear grass growing on the reserve.

Ten young cattle, all about one year old, were purchased in June from neighbouring villages.

A cheap corrugated iron shed open on one side was constructed for them. They were allowed to graze in 30 acres of the reserve during the rainy season and over the whole area after the removal of hay in November. From November till the beginning of the present rainy season they were stall-fed at night with a little of the hay and ensilage made on the reserve. Under that treatment they have kept in good condition; their girth measurement was taken at intervals. It is given in the statement below:—

Serial No.	Sex of the animal.	Colour.	Girth measurement of each on—		
			29th August 1910.	22nd March 1911.	14th July 1911.
1	Female	Light red	3′—7″	3′—10″	4′—3″
2	Do.	Deep red	3′—9″	3′—10″	4′—0″
3	Do.	White	3′—8″	3′—11″	4′—2½″
4	Male	Brown	3′—5″	3′—8″	4′—1½″
5	Do.	Red	3′—0	3′—11½″	4′—3½″
6	Do.	Dark red	3′—10″	4′—1″	4′—6″
7	Do.	White	3′—10″	4′—1″	4′—6″
8	Do.	Brown	3′—6″	3′—8″	3′—10″
9	Do.	White	3′—6½″	3′—7″	3′—11″
10	Do.	Red	3′—5″	3′—8″	4′—2″

The expenditure incurred for carrying out the experiment for the year ending on the 30th June is given below:—

	Rs.	a.
Cost of 10 young cattle	86	8
Pay of *kamdar*	54	0
Pay of grazier	50	0
Corrugated sheets and wood	641	15
Cost of construction	49	13
Total	882	4

D. CLOUSTON,

Deputy Director of Agriculture.

Report on Agricultural Demonstration for 1910-11 in the Northern Circle.

I.—INTRODUCTORY.

This report has been divided for purposes of convenience into twelve heads, each portion dealing briefly with the various sections of agricultural work with which the Agricultural Department has any connection in this Circle, apart from the working of the Experimental Station at Hoshangabad, a separate account of which has been published in the report on the working of the Agricultural Stations for 1910-11.

This report, however, also deals with the results obtained on the three sub-farms at Khandwa, Damoh and Mahgawan (Jubbulpore), which in their present stage are really far more of an experimental than of a demonstration nature.

II.—DEMONSTRATION WORK APART FROM IRRIGATION.

The Khandwa Sub-Farm.

The necessity had been felt by the local Agricultural Association for careful experiment with different varieties of cotton, with a view to ascertaining which variety was best suited to this district, where cotton is the most important crop. Definite information with regard to the actual profits per acre obtained from the different varieties was also required.

As these experiments will not be permanent, it was not desirable to acquire land. Totaram Patel, a malguzar and member of the local Agricultural Association, generously placed some land at the disposal of the Department for experimental purposes.

The soil was *mal* II and fairly typical of the average cotton soils of Khandwa tahsil. An Agricultural Assistant, T. K. Ghatpande, was in charge and laid out the plots. No rent was charged, but the malguzar cultivated his land in the ordinary way, using seed supplied by the Department, on condition that the Department had the first refusal of the crop produced.

In this way the cost of experiment was reduced to a minimum and the Agricultural Assistant in addition to these plots assisted the agricultural members of the district in their experiments and acted as Joint Secretary.

The land under experiment was rather more than 13 acres, divided roughly into $\frac{1}{3}$ acre plots, seven of these were under cotton and the rest under *juar* and *bajra* varieties. Owing to very late rains, the season was not very favourable to cotton.

The results were as follows :—

Variety.	Yield per acre *kapas* in lbs.	Ginning per cent.	Remarks.
Buri	333	35·8	Long staple cottons.
Combodia	200	...	
Burhanpur Local	423	33	
Bani (*karkeli*)	300	...	
Malvensis (*jari*)	384	30	
Rosea (*jari*)	280	41	Sown on higher and lighter soils than the rest.
Saugor (*jari*)	270	34	

Mr. Gammie, the Imperial Cotton Specialist, visited the plots and tendered advice. From this year's results, it is obvious that *cambodia* cannot compare with *buri* and that *bani* is quite unsuited to these parts. The Burhanpur local cotton was a mixture of no less than six varieties.

The variety which met with most favour from local agriculturists was rosea, which is a hardy variety with a very white clean cotton, and although the staple is short, the ginning percentage is high. Saugor *jari* is a very early ripening variety, which gives two pickings by the beginning of November. It is likely to do particularly well on the very thin quick-drying soils in which, owing to the present abnormal prices, cotton is too often sown now-a-days. Owing to its extreme earliness, this variety is likely to give a fair crop on this class of soil, where later varieties would fail, if the monsoon happened to withdraw early. *Buri* cotton is more suited to the heavier types of soils found in the Burhanpur tahsil. Of the *juar* varieties, the *sadagar* variety gave the best outturn. It is late and is recommended for the heavier soils only, while its quality is excellent. It is doubtful, however, whether it is better than the *saoner* variety, which has already been successfully introduced in certain tracts.

Natal *bajra* was much superior in yield to the local variety. The cotton varieties will be tested again this year omitting *cambodia* and *bani*.

Damoh Sub-Farm.

This farm was temporarily opened with the object of demonstrating the eradication of *kans* (Saccharum spontaneum), and incidentally of comparing the rival methods of flooding and deep ploughing as a means of effecting this end.

The site chosen was under the Larambagh Government *bandhan* in Hirdepur, and consisted of 7·30 acres of embanked black soil, which was particularly badly infested with *kans*.

The land was leased from Seth Kishorilal, the malguzar, on a rental of Rs. 9 *per annum*. The Agricultural Assistant in charge was Govind Prasad.

About one-third area was embanked, so as to permit of flooding in the monsoon, and the remainder was deep ploughed in the hot weather with the Turnwrest plough, one pair of bullocks and one pair of buffaloes being employed per plough.

When bullocks and men were properly trained, it was found that rather less than one-fourth acre per plough per day could be broken up.

The crop of wheat was damaged to the extent of 30 per cent by hares, which ate off the young plants and prevented them from seeding. Owing to the proximity of jungle, the nocturnal habits of these animals and the absence of other cultivation nearly, this loss was almost unavoidable under the circumstances.

Eradication by ploughing with the Batchelor, Manohar and country plough gave poor results :—

Class of soil.	How prepared.	Crop.	Outturn per acre.	Remarks.
			lbs.	
Superior *mund* ...	T. W. plough	*Pissi* ...	404	This field was originally badly infested with *kans*.
Ordinary *mund* ...	Do. ..	Do. ..	300	Do. do.
Do ...	Manohar plough.	Do. ...	197	This field had *not* quite such bad *kans* originally.
Do. ...	Country plough.	Do. ...	129	These plots suffered specially from hares, but on the other hand did not contain so much *kans* originally and ploughing did very little towards eradicating it.
Do. ...	Batchelor plough.	Do. ..	127	
Superior *mund* ..	Flooded until the end of September.	*Pissi*, linseed and gram mixture.	...	The *kans* was so thick that only a small portion of the plot could be sown and the crop was not worth harvesting.

The flooded plot was on a slight slope, and in consequence a strip along the bottom embankment, where the water was deep, was free from *kans*, but the rest of the field, which was only covered with shallow water, was infested with very bad *kans*.

Owing to shortness of staff, this farm has now been closed down, and the land handed back to the owner, but several important deductions can be drawn from the experiments:—

(1) Deep ploughing at the end of the cold weather with a plough that turns over the soil to a depth of 10 or more inches is a sure means of eradicating *kans*, if good ordinary after-cultivation with country implements is continued. At wheat sowing time the land ploughed once in the hot weather in this way was for all practical purposes free from living *kans*. Buffaloes or good bullocks are, however, required for the work; in this case one pair of buffaloes with one pair of bullocks being required to plough this land.

(2) The other ploughs used are not nearly so effective and will not give immediate results.

(3) Flooding is not effective, unless the depth of water over several months continuously is over two and half feet. At less depths than this, the *kans* gets its leaves above water and under such conditions seems to luxuriate even more than it does on unembanked land.

The Kanthar Demonstration.

The *kanthar* is a tract of undulating country, much cut up by *nalas*, situated along the banks and between the junction of the Hiran and Nerbudda rivers in the north-west of Jubbulpore District. Much *juar* and a certain amount of cotton is grown, but the cultivation is poor, the seed being sown broadcast and hand weeding only being possible. Labour in these parts is scarce at certain seasons, and is daily becoming dearer. Consequently, an attempt is now being made to introduce the Berar method of sowing these crops in lines.

An Agricultural Assistant (Ganpati Narain) was stationed at Patan, and four demonstration plots were sown by him at selected centres. The season was not favourable, but the results are greatly in favour of the new method:—

Village.	Demonstration plots.		Locally sown plots.		Remarks.
	Area in acres.	Outturn per acre in lbs.	Area in acres.	Outturn per acre in lbs.	
Hardua ...	18	250	5·50	218	
Chhatarpur ...	1·50	407	Not	taken.	*Geunra* land.
Karaiya ...	20	450	5	160	The difference in appearance of the field and the yield of *karbi* was also very striking.
Debi Suraiya ...	5	Not weighed.	Not	taken.	Heavy soil. Local crop ploughed up and experimental crop poor.

In addition, a Lodhi cultivator at Hardua sowed a few acres of cotton on the advice of the Agricultural Assistant, and obtained a far superior crop to that sown by local methods.

It must be remembered that owing to late rain the season was unfavourable to the crop sown in lines, as interculture was difficult owing to absence of breaks, and late rains saved the broadcasted crops from being affected by drought, as they are very liable to be. In addition, actual figures showed that the saving in the cost of cultivation was Re. 0-14-0 per acre. No expense beyond the salary of the Agricultural Assistant was incurred, as the owners of the land simply sowed their land by the new method instead of the old, their servants and bullocks being trained and the work supervised by the Agricultural Assistant.

The results are so encouraging and the local cultivators appear to be so keen, that seven trained *kamdars* are being employed this year, and a large

number of cultivators are being taught the new method in a number of different villages in this tract.

Minor Demonstrations.

A *rabi tifan* specially constructed for local conditions was demonstrated in the Sehora Tahsil, where the seed rate is very high (often 150 lbs. per acre), mainly owing to the lack of skilled sowers at sowing time. Results showed that this implement works satisfactorily in embanked *mund* soils, but is difficult to manage in *kabar*. The seed rate can easily be reduced to 90 lbs. per acre without affecting the outturn.

III.—SEED FARMS.

Wheat.

The class of bread wheat which fetches the best price in these parts is the soft white *pissi*. This is not a strong wheat, but owing to its peculiar property of producing a very white flour it is in great demand in England, and until buying agents are prepared to change their demand, it is useless attempting to persuade the local cultivator to grow a stronger variety, as he will not be able to get such good prices for it.

Merchants do not, however, like wheat which is a mixture of several varieties, and much good can be done at once by inducing the producer to grow pure wheats instead of the mixture which is so frequently sown in some districts, as higher prices are always given. The present policy of the department, then, is to enable the local grower to obtain pure wheat seed, by organizing seed farms in tracts where the wheat is notorious for its lack of uniformity.

The variety of wheat chosen is that in universal demand, *viz.*, the soft white *sukerhai pissi*. The Hoshangabad Farm sells all its surplus stock of selected seed to certain chosen agents, generally malguzars or Court of Wards estates who propagate the seed on their own home-farms. They are allowed to purchase the seed only on condition that they sell their seed for seed purposes alone, and a register is kept by them of the persons to whom they have sold their seed. These seed farms are inspected by officers of the department, and at harvest time it is seen that the pure wheat crop from the seed farm is kept on a separate threshing floor, this point being specially insisted on. *Pissi* farms have been started in Seoni, Jubbulpore and Narsinghpur Districts, and the prejudice common to nearly all local cultivators that the white grain would change into red under existing soil and climatic conditions has been effectively dispelled by demonstration.

The Seoni Court of Wards Seed Farm.

This farm was started in 1909. Last year the area of the Court of Wards seed farms was 120 acres, and in addition 110 acres of pure seed was distributed and sown by the tenants of the same villages. This year six malguzars will open seed farms, varying from 25 to 125 acres in extent each. The seed available is now only sold to persons who are willing to start a seed farm of not less than 25 acres, as the larger the seed-farms, the greater the prospects of the seed being kept pure.

Rates were unfavourable this year, but Messrs. Ralli Brothers' agent valued samples at 14 annas a *pulla* (Re. 0-4-6 to Re. 0-5-0 a maund), higher price than the average *pissi*, which contains 40 per cent red in this district.

The success of this seed-farm is largely due to the personal interest taken by the Deputy Commissioner (Mr. L. E. P. Gaskin, I. C. S.).

Sehora Seed-farms.

Three seed-farms belonging to local members of the Agricultural Association, Jubbulpore, were started close to Sehora two years' ago. The variety is

selected *sukerhai pissi* from Hoshangabad Farm. The results both this year and last were excellent. This variety has yielded from 100 lbs. to 200 lbs. per acre more than the local mixed *mundi pissi*, and also fetches from 1 to 2 seers per rupee higher price in local markets. One of the owners had no difficulty in disposing of some of his spare seed at 10 seers per rupee, the rate for local *pissi* at the time being 16 seers.

The areas of these seed-farms, this year, were as stated below :—

Owner.	Village.	Area during the year under report in acres.	Approximate outturn per acre in lbs.	Area to be sown next year.	Seed for disposal to others.
Rai Bahadur Bishnu Datta Shukul.	Pahrewa ...	15	900	130	All will be sown in his own home-farms.
Do. ...	Ponda ..	15	500	70	
Pandit Gurudin Misra ...	Bargawan ...	68	1,000	650	Seed will be distributed to tenants of his village and selected persons.
Pandit Keshorao Phanse...	Simaria ...	25	600	150	All this year's crop is required for his own home-farm.
		123		1,000	

Mr. Gurudin Misra will have nearly 3,000 lbs. to dispose of this year, which he has promised to sell for seed purposes in large lots to neighbouring malguzars and selected tenants, who are particularly anxious to purchase this variety. The other two owners are keeping their own seed for another year, as they intend to propagate enough seed to sow the whole of their home-farm wheat land before they dispose of any seed.

With a view to obtaining proper prices for this variety, a selling agent will be possibly appointed at Sehora Ganj, who will register the orders of persons who wish to obtain seed and arrange for the sale of surplus stocks.

This variety is so popular now that members of the Agricultural Association have purchased seed to start ten more seed-farms of 25 acres each in the Jubbulpore and Patan Tahsils, next year, each person guaranteeing to propagate the seed, until his home-farm cultivation in the village is all sown with this variety.

Other Seed-farms.

Two seed-farms in Narsinghpur District, belonging to Pandit Govind Rao of Linga (19 acres) and Munshi Raghubirprasad of Deonagar (15 acres), are progressing well, and the grain produced is well up to the mark. They will sow the whole of their seed again next year.

Chaudhari Nizamsingh of Hidki-Piparia also, in this district, has a seed-farm (30 acres) for *hansia*, a hard yellow Macaroni wheat, originally obtained from the Hoshangabad Farm, which is of much superior quality to the dull red *kathia* used for local consumption and realizing eight annas to one rupee a *mani* (4 maunds) higher price.

In Damoh and Saugor several small seed-farms have been started this year, but owing to lack of staff it was impossible to supervise them properly.

In addition to the six large seed-farms for *sukerhai pissi* at present supervised by the department, 18 more each of not less than 25 acres in extent will be started by members of the local Agricultural Associations, *viz.*, 6 in Seoni, 10 in Jubbulpore, and 2 in Mandla District.

It is intended to extend this system of privately-owned seed-farms, supervised by the Department, as a means of introducing improved varieties of other crops, *e. g.*, cotton in Nimar and Hoshangabad and *purvi maghai til* in Narsinghpur and Hoshangabad.

IV.—Agricultural Associations.

These societies have on the whole made a great deal of progress in the last two years. Nimar, Narsinghpur and Jubbulpore are particularly strong, and although they owe a great deal to the interest taken in them by their respective Deputy Commissioners and their staff, yet the members both individually and collectively appear to have realized the objects for which these associations were formed.

Seoni and Damoh have also improved considerably, and with continued sympathy from the district staff will rapidly develope into useful associations.

Of the others, there is little to be said. They cannot really be said to exist as associations, for there is no cohesion among the members and no continuity of experiments. Although each contains one or two malguzars, who are anxious to do something, yet the majority of the members consist of money-lenders, amateurs and vakils whose lives are not bound up with the land, and until these associations contain more real cultivators, little good can be expected from them. This refers to Hoshangabad in particular, in spite of the fact that it possesses the advantage of an Experimental Farm in the district, and to try and remedy the present state of affairs, a sub-association has been started at Seoni-Malwa, composed of malguzars and tenants directly interested in the land, and a satisfactory start has already been made.

In Nimar experiments were made with varieties of cotton, *juar*, ground-nut and wheats suitable for irrigation.

Big Japanese ground-nut has been very successful, and its demonstration on a large scale has been started this year. The yield is at least twice as large as the *deshi* variety. It also fetches a higher price and is far easier to harvest. *Buri* cotton was grown on 300 acres in Burhanpur Tahsil last year. Enhanced prices were obtained by the assistance of the department, but, owing to the vagaries of the local cotton dealers, it will be almost impossible for the cultivator to obtain these prices, unless a buying agency for this class of long-stapled cotton is opened at Burhanpur. The outturn was estimated to be less than *jari* cotton by about one maund seed cotton per acre, in spite of the fact that this variety grows well here on heavier soils. The cultivation of this variety will be continued again this year, but unless cultivators can be certain of obtaining full prices for the better quality of this cotton, they will certainly continue to give preference to *jari*, which gives a bigger yield and is a hardier crop. Before leaving this crop, it may be mentioned that careful experiments have been conducted through the agency of the Agricultural Association in every district in this circle, with the result that it can be fairly definitely stated that *buri* cotton is likely to succeed in the Sausar Tahsil of Chhindwara and in the Seoni-Malwa and Harda Tahsils of Hoshangabad, in addition to the Burhanpur area.

In all other tracts in this circle the variety appears to be too late to give a profitable crop, as it is specially liable to damage by frost.

In the Kareli tract of Narsinghpur, an attempt was made to introduce a yellow-seeded variety of *maghai til*, which five years' experiments had shown to give a better crop on the average, and to be of superior quality than the *deshi* variety. About 300 acres were sown. Arrangements with regard to the distribution of seed and the sowing of the variety pure were made by Pandit Govind Rao and other members of the local Agricultural Association.

The arrangements made were satisfactory, but unfortunately the season was most unfavourable, and as a result much of the land sown with *maghai til* was ploughed up in November and sown with gram. In consequence owing to the small

quantity of the new variety which could be shown in Kareli market, the arrangements which had been made with a view to the realization of higher prices for its superior quality, fell through. Local Banias have, however, discovered that this variety produces a higher percentage of better quality oil, and are giving better prices than for the *deshi maghai til*, and there is every chance that the introduction of this new variety will be rapidly effected. This year a large area will be sown in this tract and also in the Seoni-Malwa Tahsil. Arrangements with regard to the distribution of seed are being made by the local members under the supervision of the department.

The Narsinghpur Association is also doing much good work in encouraging the spread of *rabi* embankments in the Gadarwara Tahsil. The winnowing machine has also been so successfully introduced, that in many tracts of this district it has become a necessary machine for the larger wheat growers.

The big Japanese variety of ground-nut is being introduced with success where conditions are favourable in Nimar, Jubbulpore and Seoni. Members of the more forward Agricultural Associations are now carrying out their experiments with the new seeds and implements recommended by the Department on a far more reliable scale and trustworthy results are being obtained. In the more backward districts, however, although results are produced at the meetings, one regards them with a great deal of suspicion. Wherever important experiments are being carried out by members, the plots are always inspected, if possible, but with the limited staff at present at the disposal of the Department this cannot always be done.

A Divisional Agricultural Meeting was held at the Powarkhera Farm, Hoshangabad, in February. The meeting lasted for two days and about sixty agriculturists, representing all the five districts of the Nerbudda Division, together with some from other districts, attended. Visitors were shown all the experiments in progress on the farm, special interest being taken in the wheat trials and in the cattle. A demonstration of a number of new implements and machines now under trial was also given, and the opinion of those present taken on their suitability or otherwise. On the second day, an auction sale of about thirty animals from the farm herd was held and in the evening meeting was held, presided over by the Director of Agriculturae, and lectures on appropriate subjects were delivered. This was the second meeting of this kind, and it is intended to make it an annual affair. Numbers of persons were kept away this year on account of plague, which was raging at the time both in Itarsi and Hoshangabad.

A similar function will be organized for the Jubbulpore Division as soon as the new farm has been started.

V.—Use and upkeep of implements.

The winnowing machine is in chief demand : there are probably more than a hundred at work in Narsinghpur District alone, where this machine has achieved its greatest popularity. The spread of this and other machines would be greatly facilitated if a means for effecting repairs or replacing broken parts were more easily available. Many of the winnowers inspected during a tour in Narsinghpur District, last February, were not working so well as they ought to have been owing to misuse through ignorance, and this in spite of the fact that printed instructions explaining the working are pasted on to each machine as it is issued. It is intended to open sub-implement depôts, each with a trained *mistri* attached, at selected places, with a view to remedying this state of affairs.

Iron sugarcane mills are being slowly introduced both by departmental and private agencies in parts of Narsinghpur, Jubbulpore and Damoh, and the iron box mote is likely to replace the leather mote in Nimar and is now being made locally by *lohars* in Khandwa.

In parts of the Nerbudda Valley and Chhindwara the want of agricultural labour at wheat sowing and harvest time is very severely felt.

Sowing has often to be done by children, with the result that the seed rate is frequently as much as 150 or 160 lbs. per acre. New seed drills and a new reaper have been designed to suit local conditions, and it is hoped that they will remedy these faults. They will be thoroughly tested this year, and, if they prove successful, will be demonstrated as widely as possible.

VI.—Damage by wild animals.

An enquiry was made into the extent of damage done by pigs. All districts suffer to a greater or less degree. Hoshangabad is most affected, but parts of Jubbulpore, Narsinghpur and Nimar also suffer seriously. In Narsinghpur an attempt was made to trap them. A member of the Agricultural Association was supplied with two spring snap traps, but up to the present he has reported no success. Pig vary their way of entry into an unfenced field from night to night and it is seldom that they stick to the same path twice running. They also frequent roads and footpaths, and traps placed in such situations are a danger to human beings and cattle. The issuing of many gun licenses also does not seem to do much good, as many of the license-holders do not possess guns and *shikaris* do not trouble to shoot pigs, if there is any larger and more valuable animal about.

In the Shahpur tract of Betul, it was reported to me by local malguzars that the recent increase in pig is caused by the destruction of red dog owing to the enhanced reward placed on the latter animal. The accuracy of this statement I cannot vouch for.

The Seoni-Malwa Agricultural Sub-Association have engaged the services of some Naths to kill pig, which do so much damage in this tract that it is almost impossible to grow *jalalia* (a wheat of superlative quality) and the cultivation of *juar* is also seriously jeopardized. The Naths are a wandering tribe, and this gang consists of about seventeen able-bodied men with thirty trained dogs. They can only work in small patches of jungle and ravines. The dogs, having located a pig, chase it to a standstill after a short run, and the Naths then run up and despatch it with their short heavy spears. Two hundred and seventy-two pigs were killed by the gang in the first six months, besides several panthers and hyenas. Pig killing circles have now been formed in villages along the Nerbudda, where pigs are particularly destructive.

The gang of Naths receives Rs. 12 per mensem from Government, so that their movements may be controlled and a local committee of the malguzars collects subscriptions from the cultivators, in order that the Naths may receive in addition 4 annas for every pig killed. This measure has just been started, and the experiment will be watched with interest.

Wild cattle.—The Babai herd has now been dispersed. The measures employed two years ago only resulted in the capture of 14 of the herd. The cultivators, however, learnt their lesson and rebuilt the *khirak* at a spot nearer Babai village. Drives were organized on nights when the herd approached the village square, to lick up grains of salt which had dropped from the Banias' stalls, and resulted in the capture of thirty-five cattle, which were practically all that were left in the herd. The wild cattle resembled village cattle in general appearance, and were trained with little difficulty to work at the plough.

VII.—Special Enquiries.

An enquiry was made into the oil-pressing industry, with a view to its extension within the limits of the Province, and thereby stopping the continuous drain off the land, which occurs when oil-seeds are exported as such out of the country.

The main cause which is hampering the establishment of oil-pressing factories at present is the difficulty experienced in disposing of the cake. A report has been submitted to the Reporter on Economic Products and sugges-

tions made to remedy the present state of affairs. In collaboration with the Imperial Entomologist an enquiry was made into the damage done by white ants, which had been reported as causing considerable loss to crops both this year and last in such districts as Hoshangabad, Damoh and Saugor.

Experiments with a view to finding out a simple and cheap way of getting rid of white ants are being carried out on a large scale on the Hoshangabad Farm. There is reason to suppose that the damage done to wheat by this pest is often greater than is generally suspected, because the wheat plant is most generally attacked after it has come into ear and just before it changes colour.

Plants killed by white ants may easily be mistaken by the casual observer for prematurely ripened plants. An experiment on the Hoshangabad Farm showed the actual damage in one field to be no less than 30 per cent, and this field was not so badly attacked as some cultivators' fields I had seen.

VIII.—Court of Wards.

Assistance in the shape of advice was supplied when asked for, but no Assistant from the Department was actually detailed for Court of Wards work for the simple reason that the Department cannot possibly spare the men at present owing to existing paucity of staff in comparison with the amount of important work already taken in hand.

In the Diwan's estate under the Seoni Court of Wards, in addition to the establishment of the wheat seed-farm referred to above, advice has been given with regard to the cropping of individual fields and the introduction of improved methods of rice cultivation.

Mr. Tundilal, the Farm Superintendent, Raipur, made a special tour for the purpose of advising on rice cultivation in particular.

The Deputy Commissioners of Betul and Narsinghpur were advised with regard to improving the cropping and agricultural practice in the Deshmukh estate of Bhaisdehi and various minor estates in the Narsinghpur District.

It is hoped to make a detailed enquiry into the Harrai estate of the Chhindwara jagirs next season.

IX.—Irrigation.

Agriculturists in this circle as a whole do not employ irrigation and the practice is not generally understood, except in parts of Nimar where wheat is irrigated from wells and in Betul, where sugarcane is an important crop.

Minor irrigation works intended primarily for crop protection are under construction in several districts of the Jubbulpore Division, notably Jubbulpore District itself and several are already in a position to supply water. The problem, as it stands at present, consists in finding out what crops can be profitably irrigated in years of average rainfall; and having found what crops can be irrigated, to demonstrate suitable methods to the cultivators of land commanded by these tanks, so that they may be enabled to make full use of the water. Conditions vary considerably from those of the Chhattisgarh Division, where the Department has been experimenting for several years, and it was evident that experiment would have to precede demonstration here.

To this end a small plot of land, seven acres in extent, was rented under Barera Kalan tank in Mahgawan village, Jubbulpore Tahsil. The land was unoccupied, and was the poorest land in the village, being all classed as *sehra* and being particularly liable to the ravages of pig and other animals. This land was assessed at 10 annas per acre. Experiments were made with irrigation on ground-nut, *dhan*, wheat and linseed. The variety of *dhan* grown was *raskadam*, an early variety of good quality, and was transplanted. The crop was

ready for harvest at the beginning of October and gave a good yield. Owing to the abnormal extension of the monsoon no irrigation was required :—

Variety.	Treatment.	Seed rate per acre in lbs.	Outturn per acre in lbs.
Raskadam ...	Transplanted ...	40	1,414
Local early ...	*Machua* ...	240	800

Transplantation might with advantage be introduced into this tract, but it is useless to attempt to introduce rices of superior quality, until pig have been reduced in number. The seed bed received a light dressing of manure, and the area was afterwards ploughed up and sown with wheat as a second crop with irrigation.

Ground-nuts gave the poor yield of 566 lbs. per acre. The big Japanese variety was grown and the plot suffered from water-logging, owing to the long continuation of the rains and the flat nature of the land on the farm. The experiment will be continued this year on a well drained field.

Pissi was a most disappointing crop, and it is very evident that without manure, wheat is not likely to pay on this class of land, even with unlimited irrigation. The land is far better suited to rice.

The results of the *rabi* crops are given in detail below :—

Treatment.	Crop.	Outturn per acre in lbs.	Remarks.
Unirrigated ...	*Pissi* ...	164	Straw very short and ears very small.
One irrigation ...	Do. ...	212	A little rust.
Two irrigations ...	Do. ...	192	Straw rather taller, but patchy crop. More rust.
Three irrigations ...	Do. ...	200	Badly attacked by rust after the last irrigation.
Green manure *san* ploughed in one irrigation given.	Do. ...	313	Germination very defective. In places the crop was quite good.
After ground-nut. Two irrigations ...	Do. ...	200	A miserable crop sown late and badly affected by rust.
After transplanted *dhan*. Two irrigations.	Do.	409	The *dhan* crop had been lightly manured. The grain obtained was of good quality.
One irrigation ...	Linseed ...	140	Defective germination, much damaged by pig.

N. B.—The first irrigation was given one month after sowing.
The second do. do. two months do.
The third do. do. three months do.

The variety of rust was Puccinia graminis, and the rust attack on this light soil was far worse than on the black soils of the neighbourhood where comparatively little occurred.

The effect of manure was shown by the appearance of the crops grown after green soiling and transplanted rice. This class of land is capable of giving a fair crop of linseed and *til*, but gram does not succeed.

Experiments will be continued until the permanent Jubbulpore Farm is ready, and this year the area under *dhan* will be increased and several local cultivators trained in the method of transplanting rice and irrigation by the long bed system.

X.—Fairs and Shows.

Seven fairs were attended during the year by officers of the Department. Exhibits of improved seeds were sent and implements demonstrated. An Agricultural Show was also held at each fair, with the exception of Singaji which was

confined to entries of cattle. Judging was done by the Agricultural Officers present, assisted by a Committee of members of the local Agricultural Association :—

District.	Month.	Fair.	Class.	Approximate attendance.
Nimar	October ...	Singaji ...	Cattle ...	30,000
Hoshangabad	November ..	Bandrabhan ...	Religious ...	30,000
Jubbulpore	Do. ..	Bheraghat ...	Do. ...	3,000
Seoni	Do. ...	Mundara ...	Do. .	10,000
Betul	January ...	Malajpur ..	Do. ...	6,000
Damoh	Do. ...	Bandakpur ...	Do. ...	3,000
Saugor	February ..	Garhakota ...	Cattle ...	3,000

The show at Burman in Narsinghpur District, which is one of the largest and most important in the Province, had again to be stopped for the second year in succession owing to plague.

A special effort will be made to resuscitate it this year, as it is one of the most promising fairs on account of the interest taken by the people.

Next year the Hirdenagar Fair in Mandla District will also be attended and a show initiated.

The Bandrabhan Fair was as usual well attended and the number and quality of the exhibits showed an improvement on last year.

The exhibits at Garhakota were comparatively few in number, but the quality was excellent, being far better than that of any other fair attended. This fair serves a comparatively small and remote tract and the exhibits were brought in by the cultivators themselves on the morning of the show.

The Mundara show has only recently been started and a great improvement was shown this year, in spite of the fact that owing to late rains, many people were kept away as they were busy in sowing their *rabi* land. At this fair the policy of granting large rewards for the best sample of the more important crops, instead of numerous small prizes to all crops, whether important or minor, is being tried. For instance, a special prize of Rs. 50 was given for the best exhibit of *ekdania pissi*, as a special attempt is being made to improve the uniformity of wheat in this district.

The Bandakpur Fair is still in the initial stage, but shows signs of improvement.

Bheraghat was again particularly disappointing, and was attended mainly by shop-keepers and others from Jubbulpore City. Local malguzars and cultivators take little interest in this fair for some reason as yet not ascertained.

Malajpur was also very poor, but the tract served by this fair is not nearly so naturally rich as the Jubbulpore haveli and the people are far more backward.

With the exception of the two last-mentioned, however, it may be said that these shows are doing much good, as in addition to proving a nucleus for the improvement of the district, they often lead to results which are not always apparent until after one or two years have elapsed.

XI.—Publications.

A bulletin entitled 'The improvement in the quality of wheat exported from the Central Provinces' was issued in the year under report. This note deals with the possibilities of improving the quality of local bread wheats suitable for the export trade and contains a report by Mr. A. E. Humphries, President of the British and Irish Association of Millers, on some wheats sent to him for examination.

The following short leaflets in Hindi were published from my office dealing with the special cultivation of new varieties of crops recommended by the Department and the management of improved kinds of machines. These leaflets are issued with each sample of seed or each implement ordered by private persons and other copies were sent on application to selected School Masters and cultivators.—

List of Vernacular leaflets.

1. Yellow flowered *jari* cotton.
2. White do. do.
3. *Buri* cotton.
4. *Purvi maghai til.*
5. Early ripening *tur.*
6. Saoner *juar.*
7. Bilaspur *tur.*
8. Khaperkheda peas.
9. Acclimatized peas.
10. Big ground-nuts.
11. Winnowing machines.
12. Potato cultivation in the rains.
13. The sowing of *juar* and cotton in lines.

In addition, several articles were published in the *Central Provinces Agricultural Gazette*, a magazine which is increasing in popularity in this circle, and certain notes which were read before the various Agricultural Association Meetings, were cyclostyled and copies distributed to members.

XII.—District Gardens.

The Civil Surgeon or the Superintendent of the District Office is generally the Honorary Superintendent of the District Gardens. Where the Superintendent takes great personal interest, these gardens are serving a really useful purpose.

This is specially the case at Narsinghpur where the garden is exceptionally well looked after.

In other cases, often owing to the unavoidable changes caused by the transfer of the officer acting as Superintendent, the condition of the gardens has fallen away. In some districts the Superintendent of Gardens is *ex-officio* a member of the Agricultural Association and provides a list of grafted fruit trees, shrubs, seeds, &c., available for sale in the gardens.

Much good work in the dessimination of improved fruit trees and vegetable seeds has been done in this way, in Narsinghpur, Saugor, Betul and Seoni in particular.

The gardens are inspected by myself from time to time and recommendations made with regard to the trial of new varieties of fruits, &c. A book is kept in which the success and failure of these experiments is noted, in order that the repetition of experiments with a particular kind of fruit or vegetable, which often occurred formerly, may be avoided.

These gardens can never reach a higher state of efficiency than at present, however, until provision is made to enable the head *mali to* obtain a higher rate of pay.

XIII.—Mention of Staff.

Four Agricultural Assistants were posted on demonstration duty at the following places :—

1. Khandwa.
2. Damoh.
3. Mahawan near Jubbulpore.
4. Patan.

All have carried out their duties creditably, and special attention is drawn to the good work done by Ganpati Narain in the *Kanthar* tract of the Jubbulpore District.

In addition, the services of the Superintendent and Overseers of the Powarkhera Farm were utilized from time to time for smaller demonstrations and for attendance at the various fairs. The Department is also indebted for the assistance rendered by the various Deputy Commissioners and their staff in those districts where demonstrations were in progress. Each year it becomes more and more evident how necessary it is that the Department should continue to enlist the sympathy and active co-operation of the District Revenue Officials, if any rapid progress is to be made. I am personally indebted to many such officials for their assistance during the year under report and should like in particular to mention the good work done by Mr. K. S. Datey, as Secretary of the Jubbulpore Agricultural Association, and of Syed Mehar Ali, the Tahsildar of Khandwa, while others could be mentioned to whom the Department is almost equally indebted.

G. EVANS,

Deputy Director of Agriculture,

Northern Circle.

DEMONSTRATION WORK IN BERAR.

Demonstration work.—The seed farms serve the purpose of demonstration centres for the distribution of pure selected varieties of cotton and *juar*. On these, too, the use of the turn-wrest plough and improved Berar hoes is demonstrated to cultivators The method of using copper sulphate as a fungicide for *juar* smut and of making urine-earth was demonstrated at the head-quarters of the 4 assistants, who were in charge of the seed farms in this division. The working of the fodder cutter, winnower, turn-wrest plough, Hoshangabad *bakkhar* and hoe was shown at Devalgaon Raja, and Pimpalgaon Devi fair, at the ploughing match and the divisional meeting held on the farm. Groundnut, selected *juars* and cottons were also exhibited on these occasions.

Seed Farms.—Twenty-one new seed farms have been started during the year, bringing up the total in my circle to 42. The owners have agreed to pay for the seed supplied to them from the experimental farm; so that in future these farms will be entirely self-supporting. The one great difficulty in their management consists in getting the *kapas* ginned in time. During the year under report the prevalence of plague and the consequent scarcity of labour at the end of the picking season in many of the villages, where these seed farms exist, aggravated the difficulty, and the price of cotton had fallen before the owners could get their *kapas* ginned on the country *charka*. Several owners have therefore decided to set up small ginning plants of their own, consisting of 2 or 3 gins, driven by an oil engine. The total amount of cotton seed distributed by the experimental and seed farms, for the year, amounted to 134,464 lbs. A list of existing cotton and *juar* farms and the seed to be sown in each, this season, is given in the statement attached.

Agricultural Associations.—The agricultural associations in Berar are intelligent and flourishing bodies. Several new members have been elected during the year. The meetings were well attended and most of the members have taken a practical interest in the work of their association by assisting the department to distribute copper sulphate among the cultivators and in other ways. The owners of 32 out of 36 existing seed farms of this division are members. Some members have assisted in demonstrating the use of the turn-wrest plough.

The Buldana Association has taken a new step in raising funds. The members pay an annual subscription of Rs. 3 each. Life members are admitted on payment of Rs. 50. Funds realised in this way are to be utilized in developing agricultural shows in the district. Rao Bahadur D. V. Bhagwat and Rao Bahadur Deorao Vinayak, capitalists of Akola, joined the Akola Association during the year under report. Both are fairly large landowners and are keenly interested in the development of agriculture and promise to be acquisitions to their District Association. The Yeotmal Association has shown signs of new life during the year. Mr. Landge, Izardar of Sonwadhona, has for years been a leading light in this association. Mr. Kane, Izardar of Waihingi, too, has done good work as its Secretary.

Considered as a whole, these District Agricultural Associations are useful institutions. At present they require constant guidance and the usefulness is dependent on the amount of attention which we can give them. They will, I believe, develop faster, as our department grows in efficiency and staff.

The divisional meeting held on the farm, in the last week of October, enabled the members from different districts to meet together, to see for themselves, and to discuss the lines of improvement which the Department is carrying out at its experiment station. The members of the Berar Associations are, we believe, fully convinced of the beneficence and the good intentions of the Government.

Damage by wild animals.—The damage by wild animals in Berar does not amount to so much as in the Central Provinces owing to the limited area under jungle. Wild antelope are fairly plentiful all over the division and devour large quantities of the grain of *juar*, *tur*, *mung* and other crops and the green

bolls of cotton. Monkeys do the same but to a less extent. The ravages of wild pigs are limited to cultivated areas near the jungle and forest reserves. A herd of wild cattle in Sagoda Reserve has for years been a thorn in the flesh to the cultivators of surrounding villages. Steps have been taken by the Forest Department to capture these. With the assistance of our department five have been captured and it is hoped that the whole herd will soon be accounted for. Three of the five were young animals and have already been thoroughly domesticated on the Akola Farm to which they were brought by the Superintendent who captured them. Owing to the large amount of *juar* grown in this division myriads of *juar* birds have to be reckoned with in November and December when that crop is ripening. These birds probably do more damage than all the other animal pests put together.

Special enquiries.—An investigation into cotton wilt disease was made and has been referred to in the body of the report on the experimental farm.

Publications.—Leaflets on *buri* cotton, copper sulphate and the turn-wrest plough were distributed at shows and meetings of agricultural associations.

District gardens.—Groundnut, maize and gram were distributed to some of the gardens. Owing to the difficulty of getting sufficient water, the gardens in Berar produce less in the way of fruits and vegetables than one would like.

Mention of staff.—The staff employed on the experimental and seed farms have worked well. Mr. Maniram Barkur's work in the Anjangaon seed centre, where under his management the area under *buri* has largely increased, is worthy of special mention. Mr V. B. Dhamapurkar has improved greatly in health and efficiency since his transfer to Akola Farm.

Mr. Bhayalal, L. Ag., Superintendent of the Farm, has continued to do very good work in supervising the experimental farm and in the execution of his duties as Superintendent also of the seed farms. Under his management, the experimental farm is increasing in popularity.

Statement giving particulars of Seed Farms.

No.	Name of owner.	Place and Taluq.	Quantity of Rosea seed supplied from		Rosea cutchica.	Malvensis.	*Buri.*	Saoner *juar.*	Chapti *juar.*	Ramkel *juar.*	*Lamkanti juar.*	Proposed area under	
			Akola farm.	Local seed farm.								Cotton.	*Juar.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14
			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
	BULDANA DISTRICT.												
1	Ramji Patil ...	Bori Adgaon, Khamgaon ...	150	...	...	40	200	20	20	20	...	39	10
2	Pandalik Ganpat Patil ...	Botha, Khamgaon ...	...	...	130	50	60	...	...	...	...	24	...
3	Gopal Shreedhar Deshpande ...	Chikhli ...	100	...	...	...	60	120	16	...	...	18	22
4	Mr. Anekar, Pleader ...	Jalamb, Khamgaon ...	150	...	...	...	50	...	...	...	...	20	...
5	,, Gulam Ahmad Khan ...	Pimpalgaon Raja, Malkapur	150	280	...	...	40	...	...	...	...	47	...
6	,, Nilkanth Umakant Deshpande.	Dongarsherri, Chikhli ...	50	...	...	130	50	...	...	...	...	23	...
7	,, Rajeshwarrao Venkatrao Deshmukh.	Shendurjana, Mehkar ...	...	...	100	...	50	20	20	...	...	15	6
8	,, Laxman Sao Balkrishna Sao.	Dongaon, do. ...	...	...	100	...	50	20	20	...	...	15	6
	AKOLA DISTRICT.												
9	Sayad Mahmud ...	Chitola, Balapur ...	150	90	...	...	80	...	...	...	...	32	...
10	Mr. Mesaji Patil ...	Batwadi, do. ...	...	...	267	65	180	...	...	...	...	40	...
11	,, Govind Balvant, Patwari ...	Do., do. ...	...	...	200	...	60	...	...	...	...	26	...
12	,, Ganu Patil ...	Turanga, do. ...	...	...	100	70	70	...	...	...	...	24	...
13	,, Vishnu Ganesh, Kulkarni...	Gaygaon, do. ...	100	...	...	...	50	...	...	...	...	15	...
14	,, Ramdayal ...	Ukhli, Akot ...	140	...	...	...	120	...	50	68	50	26	16
15	,, Eshwardass ...	Do., do. ...	150	...	...	...	60	...	...	...	...	21	...
16	,, Raghunath Singh Jamadar.	Akot ...	...	200	...	...	70	40	50	...	...	27	15
17	B. B. Devrao Vinayak ...	Dhotardi, Akola ...	150	...	...	...	80	...	...	...	...	23	...
18	Mr. Pandurang Bapuji ...	Rajinda, do. ...	100	...	...	...	...	...	...	...	...	10	...
19	,, Vazir Khan ...	Akola ...	80	...	...	...	20	...	...	...	...	10	...
20	,, Trimbak Laxman ...	Risod, Basim ...	50	...	...	...	50	20	20	...	...	10	6
21	,, Jagjiwanrao Raje ...	Sirpur, do. ...	100	...	...	...	50	20	20	...	...	15	6
	AMRAOTI DISTRICT.												
22	Mr. Yeshwantrao Deshpande ...	Surji(Anjungaon), Daryapur	200	90	...	...	40	...	...	...	...	33	...
23	,, Sayad Surwar ...	Anjangaon, do. ...	...	200	...	...	40	...	...	...	...	24	...
24	,, Prithiram Singh ...	Pathrot, Ellichpur ...	...	160	...	...	270	...	...	...	...	43	...
25	,, Harlal Seth ...	Kokarda, Daryapur ...	260	...	...	...	200	25	40	...	...	36	10
26	,, Annandrao Deshmukh ...	Kholapur, Amraoti ...	140	...	...	...	20	...	...	...	...	16	...
27	,, Ramkisan Pethe ...	Morsi ...	300	200	...	100	100	60	80	60	...	70	30
	YEOTMAL DISTRICT.												
28	Mr. B. R. Landge ...	Sonwadhona, Darwa ...	320	280	...	20	120	...	...	...	...	74	...
29	,, Yeshwantrao Deshmukh ...	Talegaon, Yeotmal ...	150	200	...	...	100	...	...	...	...	45	...
30	,, D. K. Kane ...	Waihingi, Darwa ...	130	...	...	...	80	...	...	...	...	21	...
31	,, Bajirao Deshmukh ...	Bangaon, do. ...	...	220	...	...	30	...	...	...	...	25	...
32	,, Ganpat Sitaram Malvi ...	Yeotmal ...	130	130	...	...	100	...	...	...	...	36	...
33	,, Raghunath Sadoba Patil ...	Bhavi, Yeotmal ...	120	120	...	...	50	...	...	...	...	29	...
34	,, Narayan Patil ...	Shivni, Yeotmal ...	120	120	...	...	50	...	...	...	...	29	...
35	,, Angul, Pleader ...	Wadhona, do. ...	...	160	...	...	120	...	...	...	...	28	...
36	,, M. G. Deshpande ...	Ganori, do. ...	160	...	...	...	80	...	...	...	...	24	...
	WARDHA DISTRICT.												
1	Court of Wards ...	Nachangaon and Kutki Wardha.	100	...	...	100	210	...	...	...	...	41	...
	NAGPUR DISTRICT.												
2	R. B. Raghoba Ratiram ...	Saoner ...	...	...	...	340	160	...	...	...	...	50	...
3	K. B. Malak, Mehdibag ...	Umrer ...	50	...	...	...	50	20	20	20	...	10	6
4	Court of Wards ...	Deoli ...	100	...	...	...	50	...	...	...	...	15	
5	Do. ...	Kawdas ...	...	...	...	100	50	...	...	...	...	15	...
6	Seshrao Janardan Ghuse ...	Bori, Nagpur ...	100	...	...	200	50	20	20	...	...	35	4
		Total ...	4,000	2,450	897	1,815	3,320	385	376	168	50	1,179	137

Statement giving particulars of Seed Farms for 1910-11.

No.	Name of seed farm and place.	Seed distributed.					Seed used on owner's farm.					Remarks.
		Buri cotton seed.	*Jari* cotton seed.	Rosea cotton seed.	Malvensis cotton seed.	*Bani* cotton seed.	*Buri* cotton seed.	Rosea cotton seed.	Malvensis cotton seed.	*Jari* cotton seed.	*Bani* cotton seed.	
1	2	3	4	5	6	7	8	9	10	11	12	13
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
1	Anjangaon Seed Farm	7,380	1,200	1,200	...	...	...	400	...	840	...	
2	Anjangaon Circle	24,956	...	...	...	...	...	...	...	...	...	
3	Kholapur Seed Farm	615	...	300	...	...	...	...	...	...	...	
4	Morsi Seed Farm	365	6,270	233	...	...	250	2,400	250	150	...	
5	Sonwadhona Seed Farm	592	6,154	...	...	...	...	800	...	...	...	
6	Talegaon Seed Farm	1,350	...	540	...	...	...	200	...	...	...	
7	Yeotmal do.	1,086	...	...	...	...	...	...	...	...	...	
8	Sarni do.	1,404	...	...	...	...	...	360	...	...	...	
9	Darwa do.	256	...	...	...	...	...	...	...	...	...	
10	Angul's Farm, Yeotmal	544	...	...	...	...	...	...	...	...	...	Total of columns 3, 4, 5, 6 and 7 ... 103,326
11	Pimpalgaon Raja Seed Farm	2,600	...	3,200	743	...	50	520	...	...	...	Distributed by Akola Farm ... 31,138
12	Jalgaon Seed Farm	2,827	...	...	...	...	...	300	...	...	...	Total Distribution ... 134,464
13	Chikhli Seed Farm	404	...	...	...	...	80	...	...	...	...	Used by owners on their own Farms ... 8,788
14	Ukhli do.	4,426	8,000	600	...	...	80	400	...	1,000	...	
15	Risod do.	2,000	...	...	...	...	140	112	28	...	28	
16	Risod Circle Seed Farm, Empress Mills	23,781	...	...	...	...	...	...	...	...	.	
17	Chitola Seed Farm	...	...	300	...	...	...	400	...	...	...	
	Total ...	74,586	21,624	6,373	743	...	600	5,892	278	1,990	28	

D. CLOUSTON,
Deputy Director of Agriculture.

DEMONSTRATION WORK IN RAMTEK AND BHANDARA.

Demonstration work under Ramtek tank was started in June 1910, and under Khairbanda and Chandpur tanks in Bhandara the following December. Under Ramtek tank there were demonstration plots of rice, of groundnut followed by irrigated wheat and of sugarcane; and under the Bhandara tanks plots of cane only. The area commanded by the Ramtek tank is mostly cropped with *rabi*, including wheat, linseed, *rabi-juar*, gram and other pulses. The only *kharif* crops of importance are rice and *til*.

Most of the rice area is at present cropped with *chipra*, an early maturing variety which does well, in years of normal rainfall, without irrigation, but it is neither a high class rice nor yet a heavy yielder. So long as that variety continues to hold the field, there will be little demand for the irrigation of this staple. An attempt was therefore made by means of these demonstration plots to introduce our Raipur *gurmatia*, a late and heavy yielding variety. The demonstration plots were sown in 16 different villages, and the *gurmatia* seed was transplanted as 'singles' or 'doubles' as opposed to the 'bunch' method practised locally.

A similar demonstration was carried out on a larger scale in Chowa, a Court of Wards village in Bhandara. The outturns obtained from the demonstration plots of our late transplanted rice compared very favourably with that of the local varieties grown. The outturns ranged from 1,000 to 2,700 lbs. per acre. This late and heavy yielding rice can only be grown under irrigation. There has been some demand for seed this season; 7,920 lbs. have been distributed in Ramtek and 3,652 lbs. in Bhandara. To encourage the extension of the rice area, rice bunds were made, and rice grown in plots constructed for the purpose in the *rabi* area of six villages. In these plots *gurmatia* was sown, the outturns were unsatisfactory ranging as they did from only 80 lbs. to 360 lbs. per acre. The area under rice in the tahsil has slightly increased this year, more especially in Reorala and Chacher, the cultivation of our late but heavy-yielding variety is being taken up.

The Manager, Nagpur Court of Wards, reported that the single seedling method of transplanting carried out by our department in Chowa village gave an outturn of 38 times the seed, while, owing to the heavier seed rate required, the local bunch method gave 9 times only. By the new method there is a saving of nearly 100 lbs. of paddy per acre.

Groundnut was tried in 20 plots: the crop ranged from fair to very good in all the villages except Nandapuri. The outturn, weighed after lifting, varied from 500 to 2,000 lbs. per acre. Wheat was tried after it as a second crop. The groundnut having in most cases been sown late, the land was not ready for wheat till late in November, which is a month later than the sowing time of wheat in the tahsil. The demonstration was not very successful. The land got insufficient cultivation for wheat, which germinated thinly in most of the plots. Owing partly to that reason and partly to unsufficient moisture, the outturns of wheat ranged from 130 to 360 lbs. per acre only.

The irrigation of wheat was demonstrated in six villages. Owing to a bad arrangement on the part of the Superintendent in charge, the plots of two villages were harvested by owners without being weighed.

The outturn from the irrigated and non-irrigated plots of the remaining four villages are given below:—

		Irrigated.	Non-irrigated.
Kinaperkheda	...	600	330
Bhendala	...	825	770
Dhani	...	250	240
Udapur	...	670	380

The year under report was a bad one for the irrigation of *rabi* crops. In the Ramtek tahsil, the soil loses its moisture readily after the rains, and wheat is therefore sown in the first half of October. The crop is ready for harvesting in the last half of February. In the year under report over two inches of rain, equivalent to one full watering, fell in the first week of November, removing the necessity of irrigation at that time. In the beginning of December when a second irrigation would ordinarily have been given, a fall of over 1 inch again went far to remove the need of irrigation at that time. All the six plots were irrigated between the 28th December and the 5th January, but the subsequent rainfall partially deprived the irrigated plots of the advantage which they otherwise would have enjoyed. It had been intended to demonstrate plots of irrigated wheat under the Chandpur and Khairbanda tanks, but owing to the heavier nature of the soil, irrigation was still less necessary there, and it was therefore considered advisable to postpone these demonstrations for a year.

Twelve thousand seed canes were supplied from the Raipur Farm for demonstration plots in eight villages under Ramtek tank; the crop was top-dressed with castor cake at the rate of 20 maunds per acre Cane seed was also supplied for demonstration plots in five villages under Khairbanda tank and three under Chandpur tank.

Each of these lines of work has been more of the nature of an experiment than a demonstration, which reverses the order in which the introduction of agricultural improvements should be attempted. The steps taken to start an experimental farm at Tharsa, which will deal with the problems of the tract, should remedy matters. It is undoubtedly advisable to base demonstration work on the results obtained by experiments.

The work of Shaik Lal Mahamad who was also in charge of the work of transplantation in Baloda Bazar during the rains, and who was transferred to Ramtek later, is worthy of mention.

D. CLOUSTON,

Deputy Director of Agriculture.

DEMONSTRATION WORK IN CHANDA.

I.—Only one Assistant with his head-quarters at Sindewai was employed in carrying out demonstration work in this district. The lines of work undertaken were:—

The introduction of—

(i) thick canes;
(ii) ground-nuts:
(iii) the single seedling method of transplanting rice; and
(iv) the Poona system of *gur*-making.

II.—Nine thousand seven hundred seed canes of the thick varieties from the Government Experimental Farms were distributed in nine villages, in three of which they did exceptionally well; in five others they were much better than the local canes grown in the same villages: in one village the crop was attacked by *Tarap* (*strigalutea*) which badly damaged our demonstration plot as well as the local cane grown by cultivators 10,500 Raipur canes have been distributed this year as shown in the list attached.

III.—There has been a good deal of heart-burning in this circle over the loss suffered by the cultivators three years ago from the attempts made by the Irrigation Department to introduce these thick canes. The low rates at which they were paid for the cane supplied to the Hadi plant set up at Sindewai two years ago was also looked on as a real grievance. The Department has this year made an honest attempt to heal these wounds and to gain the confidence of the people. They on the other hand are still very suspicious of our intentions and have in several cases refused to give the necessary assistance for demonstration for that

reason. We succeeded, however, in introducing the cultivation of our thick canes in nine villages in 1910 and in 17 in 1911. The seed has been supplied on the loan system. The Manager of the Sindewai Court of Wards reports that from an acre grown on the home-farm of the Sindewai village, half of which was planted with thick canes obtained from our department for demonstration purposes, a profit of Rs. 280 was derived after paying cultivation expenses. The area under our thick canes on the same home-farm this year has been increased to nearly four acres.

Of the 17 villages in which demonstration work is being carried out this year, two are under Pownpar tank, one under Khairi, and five under Ghorajhiri. Owing to the bursting of the bund of the Asola-Mendha tank, nothing could be done there up to the present: but work will be started next cold weather.

IV.—A very excellent system of manuring cane and rice lands by sheep-folding is commonly practised in this district. For manuring an acre of cane about a thousand sheep are required for eight days, which costs the cultivators about Rs. 15. This is such an economical method of manuring that it is very doubtful whether any other manure can compete with it. To manure rice by folding sheep costs Rs. 2 per acre.

Cattle manure is also fairly plentiful in this district, there being no great demand for its use as fuel, owing to a plentiful supply of wood at cheap rates. It is possible that a top-dressing of cake applied before the rains begin may prove profitable in cane cultivation. Cattle manure is for the present used for this purpose; but cake being more soluble may prove more effective; castor cake has therefore been applied this year as a top-dressing to the demonstration plots in 10 villages.

V.—The Poona system of *gur*-making was demonstrated in four villages, in three of which the furnaces were constructed at the cost of the cultivators, under the supervision of a trained *gur*-boiler from Poona who was in charge. By this method there is a very large saving in fuel and the *gur* is also better than that made according to the local method. Two cart-loads of wood were found to suffice for boiling the juice derived from the cane of one acre when supplemented by the *megass* and dry leaves.

Four cane mills were sold during the year. On the whole the prospects of extending cane cultivation in the *wardi* soil of the district are excellent.

VI.—The Department had demonstration plots of groundnuts in six villages. It did very well on the *wardi* of three villages, namely, Sindewai, Seoni and Tambegarhi Menda; while in other three it was badly damaged by wild pigs. It has been tried in 10 villages this year.

The single seedling method of transplanting rice was demonstrated in 10 villages. The results are reported in the statements attached. This method of transplanting has been extended to eight more villages this year and it seems likely to take on; 1,000 lbs. of selected *gurmatia* rice from Raipur have been distributed, all of which the purchasers have promised to transplant by the single seedling method.

VII.—Much damage is done in this district by wild animals, more especally by pigs and jackals. The former are a very serious pest damaging as they do sugarcane, rice and *rabi juar* where it is grown. Page's patent fencing is being tried round the sugar-cane plot in Nanded, a *jangli* village much infested by pigs.

VIII.—Our Assistant has rendered assistance to the Sindewai Court of Wards by arranging for the cultivation of demonstration plots of cane, groundnuts and selected *gurmatia* rice.

A demonstration plot of thick cane has been opened in the Mul Court of Wards, which is also being supervised by our Assistant.

IX.—An enquiry was made as to the requirements of props and other forest material required for sugarcane. For propping cane about 2,000 props of *garari* or *tembrun* per acre are required, which is equivalent to 20 cart loads. The cost at present rates is one rupee per cart load and is equivalent to Rs. 20 per acre excluding carting and cutting. For *katai* cane, however, no propping is necessary, and for the *kala* cane for which it is solely used, the number of props required fall far short of the number stated above, owing to the irregularity of the crop and to the fact that the lighter portions are left untied. The fencing material used is *aroni*, *garodi*, *tembrun*, and other shrubs. The cost is only one-anna per cart-load. At this rate the cost of fencing the village block of cane will not exceed a rupee per acre if 10 acres are sown.

The use of large quantities of fuel for *gur*-making is pure waste, necessitated at present by the faulty ventilation of the furnace in use. For the Poona furnace wood enough to start the fire while the refuse of the crushed canes is drying is all that is required.

X.—The Agricultural Assistant attended the Mahakali Fair and a meeting of the Agricultural Association held there in May.

XI.—The demonstration plot in Sindewai village was inspected in the cold weather by the Hon'ble the Chief Commissioner, the Commissioner, Nagpur Division, the Deputy Commissioner, Chanda, and several other officers.

XII.—The following reports are attached:—

(1) Report by Sericulturist on his work at Arsod. (Not printed.)

(2) Report by land owners who grew our cane, groundnut and rice last year. (Not printed.)

Staff.—D. R. Moharikar, who has been in charge of the demonstration work round Sindewai during the year, has done very good work.

D. CLOUSTON,

Deputy Director of Agriculture,

Central Provinces.

Report on Agricultural Demonstration for 1910-11 in the Chhattisgarh Division.

The methods of transplanting rice, of irrigating wheat and of cultivating cane and groundnut was demonstrated by 5 Agricultural Assistants and 15 *kamdars* at six different centres, four of which were under Government tanks, *viz.*, Maroda and Khapri in Drug and Pindraon, Baloda Bazar and Kukurdi tanks in Raipur. Five other *kamdars* were lent to certain members of the Agricultural Associations who agreed to supervise their work. Ganesh Ram, a reliable *kamdar* of much experience, held independent charge of one centre, thus raising the number of demonstration centres to six.

2. Crop experiments were made in 89 villages with the view of ascertaining to what extent transplanting is better than *biasi*. The weighments were made by an Agricultural Assistant, assisted by two or three of the leading men of the village in each case; the latter have certified as to the accuracy of the figures given. The average increase due to transplantation this year in these 89 villages was 556 lbs. of grain per acre, the grain alone of which at 45 lbs. per rupee was worth over Rs. 12. A list of the villages and the outturns obtained is attached.

3. It is now an admitted fact that transplanting largely increases the yield, if done properly and in season, and the area transplanted will continue to increase each year, so long as the Department keeps up its present active demonstration policy in the villages. If we were to withdraw, the character of the Chhattisgarhi is such that there is little doubt, but that at least half of those who are now transplanting a certain part of their rice area would go back to their old *biasi* method, on the ground that it requires less bullock and manual labour, less water, and gives them enough rice "to fill their bellies."

4. By experiment it has been conclusively proved on the Raipur Farm, that, though the new method requires a push to be made in order to get the work done in season, the total labour required is less than for *biasi*, owing to the time saved in weeding in the case of transplanted rice. Greater dexterity in the work will no doubt come with practice, and in most villages there are already sufficiently strong bullocks or buffaloes to enable the ryots to cultivate at least part of their rice area for transplanting. Another objection to the new method, which has gained ground of late, is that those who commit themselves to it have to agree to take water from Government tanks, at what they consider very high rates.

5. The method is new to them and under present conditions "gives them trouble." The hungry village cattle graze in their nursery beds, as it is not customary to keep them tied up in their stalls at night. The bunds of their rice fields are not well made, and the result is that in most cases they do not hold enough water for puddling the plots for transplantation. In short, it is hard to introduce improvements that make for more intensive cultivation among a thriftless unenterprising people who enjoy cheap land, but lack the necessary ambition to develop its resources.

6. The Department demonstrated transplantation in 357 villages last year, and it is belived that the area done by the cultivators by the force of example and under the supervision of Agricultural Assistants and *kamdars* approached 6,000 acres. Steps are being taken this year to ascertain exactly how far the new method has caught on at the different demonstration centres, at which the Department has been working for the last three years. We are confident that by continuing the present system of demonstrating in the ryots' own fields by means of good practical men of the ploughmen class, whom we have designated *kamdars*, working under the supervision of Agricultural Assistants, it will be possible to graft this and other improved methods of cultivation on to the more primitive systems prevalent in this tract.

7. But what we want is more men of the *kamdar* class and, if possible, still more assistance from the district officials. It might be possible, too, for the Irrigation Department to lower its water-rates for the areas transplanted. This undoubtedly would be a great inducement to ryots, who are at present deterred from transplanting on account of what they consider to be a high water-rate.

8. *Irrigation.*—In co-operation with the Irrigation Department, steps were taken to push irrigation. To avoid the risk of failure we regard irrigation

as a *sine qua non* for transplantion. Every opportunity was taken for advising cultivators to take agreements from the Irrigation Department for the irrigation of rice, groundunt, wheat and sugarcane. Meetings of the cultivators convened by the Divisional Superintendent of Agriculture, assisted by the Tahsildars and Sub-Overseers of the Irrigation Department, were held under Maroda, Khapri, Hargahan, Baloda, Kukurdi, Pindraon, Kusrangi and Khola tanks in Drug and Raipur. The advantages of irrigation were fully explained and agreements taken for irrigation. Arrangements were made this year to sow nursery beds in some villages in the beginning of June with the help of tank water, and it was therefore necessary to get agreements signed before this could be done. Nurseries were prepared before the rains under Khapri, Maroda and Hargahan tanks.

9. It is a noteworthy fact that there is no very definite information available as to the increase due to the irrigation of paddy in the provinces: arrangements were therefore made last year, in co-operation with Mr. Davies of the Irrigation Department, to make crop experiments under Government tanks with the view of throwing light on this point. The experiment was made in 26 villages in 1909. Late and medium irrigated rice gave an average of 585 lbs. per acre more than unirrigated. Experiments were tried in 23 villages during the year under report (1910), and in 17 of these the irrigated late and medium rice gave an average increase of 515 lbs. over the unirrigated. Early rice in 6 villages was benefited to the extent of 316 lbs. only by irrigation. The rice grown was ordinary *biasi* in each case. Crop experiments to ascertain the increase in yield due to irrigation of wheat were made in 9 villages. The average increase due to irrigation was 269 lbs. and the area irrigated at the demonstration centres 667 acres.

10. The outturns of groundnut for 12 villages were weighed and gave an average of 2,523 lbs. per acre. This represents the weight of the crop soon after lifting. The nuts would lose about 25 per cent of their weight in drying. This crop did remarkably well wherever it was tried in *kachhar* soil. It is specially suited for soil of this kind, from which it can be easily lifted. The area under the crop this year has increased considerably. In Gunderdehi alone 12 acres have been sown.

11. Berseem (Egyptian clover) was tried after rice in two villages in Drug, in both of which it did very well. The Agricultural Assistant in charge of the plot under Maroda Tank spoke of the green clover plot being so tempting in April that all the village cattle stood up against a thorny fence, by which it was protected, "with one eye on the clover."

12. *Sugarcane.*—The area under sugarcane under Pindraon and Khapri Tanks is increasing. In Amda village under the latter tank there are 12½ acres of cane this year. Seed is supplied on loan from the Raipur Farm to cane-growers under Government tanks; 65,032 canes were distributed this year.

Some of the members of the Drug and Raipur Agricultural Associations have been of assistance to this Department in inducing others to transplant rice. Several members undertook to supervise the work in their own and surrounding villages. What they actually accomplished fell far short of what they promised to do, but the spirit shown was good and deserves to be encouraged. Several members have taken up the cultivation of groundnut, which in this district has been grown heretofore only on a very insignificant scale as a garden crop. Mr. Munshi Raghubar Dayal and Mr. Israel Tallabuddin deserve special mention for the enthusiastic way in which they have assisted the Department in introducing improvements by their good example and influence.

13. *Seed distribution.*—The Raipur Experimental Farm serves a useful purpose, as a centre from which the seed of sugarcane, rice, groundnut, etc., are supplied to cultivators. The distribution of sugarcane is increasing every year. Seed cane is given on the loan system. When the seed is given back to the Department at the time of cutting, that seed is lent to another cultivator.

14. *Damage by wild animals.*—The damage done to groundnut on the Raipur Farm has been referred to in the report. On the whole there is less damage from such sources in this division than in any other. There are very few pigs or antelope in this tract and jackals, though numerous, have not, judging from our experience on the Raipur farm, yet developed a taste for sugarcane.

15. Now that irrigation facilities have been assured for a considerable part of the rice tract, the need of other supplies of manure than those at present in use is a very real one, for irrigation without manure loses half its value. Where available, poudrette is one of the very cheapest manures, but at present it is not used by cultivators owing to caste prejudice. There is a very large export of bones from Chhattisgarh, consequent on the large number of half starved cattle kept and the high mortality among them. An attempt is being made to popularise the use of bone-meal as a manure. It was tried last year in Amda village, Drug, and gave an increase of 490 lbs. of paddy per acre. A small bone disintegrator was purchased by the Department last year with the view of manufacturing bone-meal. The disintegrator was supplied to the Manager, Raj-Nandgaon Cotton Mills, who purchased the bones locally and worked the disintegrator from the engine of a ginning factory. Very fine grade bone-meal was turned out. It is being tried as a manure for rice at the different demonstration centres this year.

Mr. Oomarali Muhammad, Manager of the Raipur Oil Mill, has agreed to purchase the disintegrator and to work it in his factory at Raipur. Arrangements are being made with the same gentleman for a supply of cake for manure. The cakes obtainable at present are castor, *til*, *sarson*, *kardi* and linseed. The first four of these were sent to the Agricultural Chemist for analysis. They were found to contain the percentages of nitrogen shown below :—

Castor	...	...	4·12
Til	...	...	4·53
Sarson	...	...	4·78
Kardi	...	...	3·00

Their cost per pound of nitrogen has been calculated and the use of *kardi* as a manure for sugarcane is being demonstrated in Ramtek and Chanda, *san* hemp and wild *sauri* (*Sesbania aculeata*) are under trial as green manures for rice on the Raipur Farm; the use of the former is being demonstrated at the different demonstration centres this year. With the view of ascertaining to what extent ploughing in the hot weather can be made to answer the purpose of manuring, as advocated by the Imperial Economic Botanist in the case of the Gangetic alluvium, an area of several acres of black (*kanhar*) soil on the Raipur Farm was ploughed for wheat with the turn-wrest plough in the hot weather, alongside of an area which was cultivated at the usual time, *i. e.*, towards the end of the rains. No appreciable difference in the wheat grown on these two areas could be discovered at harvest time. Mr. Howard, who himself visited the farm and saw the standing crop, has suggested that, where a soil is so thoroughly fissured in all directions during the hot weather, thereby exposing every cubic inch of it to a depth of a foot or more to the sterilising effect of the sun, ploughing in hot weather probably loses its effect. I am inclined to agree with him.

16. *Court of Wards and Native States.*—On the request of the Deputy Commissioner, Drug, I inspected the Gunderdehi Court of Wards and gave advice as to the advisability of increasing the home-farm cultivation. Assistance has also been given to Gandai and Gunderdehi in demonstrating transplantation and the cultivation of groundnuts. *Jari* and *buri* cotton seed was supplied to several of the Feudatory States of Chhattisgarh. *Buri* cotton stands a heavier rainfall than *jari* and consequently did much better in this tract. The Dewan of Kawardha reports that *buri* gave a twelve-anna crop, while *jari* gave 4 annas only. Sufficient *buri* seed to sow 500 acres has been supplied to that State this year.

Fairs and Shows.—The Superintendent of Raipur Farm attended the Balaghat, Nerbudda Kund, Rajim and Monkughat fairs and Changori cattle show and ploughing match, exhibited different varieties of paddy, groundnut and

sugarcane, demonstrated the use of machines and implements suitable for the tract and addressed the assembled cultivators on the following subjects :—

(i) Transplantation of rice.

(ii) Irrigation of rice and wheat and the cultivation of sugarcane and groundnut.

I also attended the last-named show.

Staff.—Of the five Assistants employed at demonstration centres, two suffered severely from malaria and had to take sick leave. Each Assistant on demonstration work has this year been supplied with a mosquito net and 840 grains of quinine to be taken twice a week, 15 grains at a time.

Mr. Tundi'al Powar, B. A., has, since the close of the year, been made Superintendent of Agriculture for the Division, and will, in future, be in a position to devote almost his whole time to demonstration work. He is very well qualified for this line. He has as usual done exceptionally good work for the department in this division during this year. The work of Ganesh Ram, Kamdar, is also worthy of special mention.

D. CLOUSTON,

Deputy Director of Agriculture.

Statement showing the Results of Comparative Crop Experiments made with transplantea and biasi paddy for Baloda Bazar Demonstration Centre.

Serial No.	Name of village.	Outturn per acre.		Increase due to transplantation.
		Transplanted.	*Biasi.*	
		lbs.	lbs.	lbs.
1	Arjuni ...	2,120	1,600	520
2	Tonatar ...	2,920	2,080	840
3	Karmada ...	3,200	2,160	1,040
4	Baloda Bazaar ...	3,880	3,200	680
5	Chirpoti ...	2,800	1,200	1,600
6	Mundi ...	2,620	1,880	720
7	Amaldiha ...	2,160	1,640	520
8	Tarma ...	3,200	2,360	840
9	Hardi ...	1,800	1,920	—120
10	Lawan ...	2,320	1,840	480
11	Labhand ...	2,320	1,280	1,040
12	Sudhela ...	2,520	2,200	320
13	Damru ...	3,240	2,080	1,160
14	Pongaon ...	3,000	1,160	1,840
15	Kasi ...	1,880	1,280	600
16	Kanji ...	2,800	1,840	960
17	Amera ...	2,520	2,320	200
18	Chirkhapar ...	1,920	1,280	640
19	Puran ...	2,440	2,080	360
20	Rawan ...	2,680	1,880	800
21	Parsabhader ...	2,560	2,040	520
22	Lalawa ...	2,120	2,120	...
23	Kumari ...	2,200	1,800	400
24	Kusmi ...	2,360	2,080	280
25	Ghurghol ...	2,080	1,920	160

Statement showing the Results of Comparative Crop Experiments made with transplanted and biasi paddy for Pindraon Demonstration Centre.

Serial No.	Name of village.	Outturn per acre.		Increase due to transplantation.
		Transplanted.	*Biasi.*	
		lbs.	lbs.	lbs.
1	Kura ...	2,300	1,370	930
2	Bangoli ...	2,209	1,428$\frac{1}{7}$	780$\frac{6}{7}$
3	Dhansuli ...	2,190	1,427	763
4	Chatand ...	2,550	1,683$\frac{1}{3}$	866$\frac{2}{3}$
5	Mohrenga ...	2,525	2,170	355

Statement showing the Results of Comparative Crop Experiments made with transplanted and biasi paddy for Kuthrail Demonstration Centre, Drug.

Serial No.	Name of village.	Outturn per acre.		Increase due to transplantation.
		Transplanted.	*Biasi.*	
		lbs.	lbs.	lbs.
1	Kuthrail ...	3,020	2,320	700
2	Chirpoti ...	2,960	2,040	920
3	Chingri ...	2,490	1,620	870
4	Kunari ...	2,360	1,520	840
5	Achhoti ...	2,240	1,600 2,540	640 —300
6	Chandkhuri ...	2,080	1,750	330
7	Risama ...	1,450	920	530

Statement showing the Results of Comparative Crop Experiments made with transplanted and biasi paddy for Resali Demonstration Centre, Drug.

Serial No.	Name of village.	Outturn per acre.		Increase due to transplantation.
		Transplanted.	*Biasi.*	
		lbs.	lbs.	lbs.
1	Hanoda ...	1,590	1,600	—10
2	Risali ...	1,820	1,300	520
3	Dhanara ...	1,120	830	290
4	Bawali ...	1,835	...	...
5	Kosa ...	1,890	1,470	420
6	Do, ...	2,590	...	...

Statement showing the Result of Comparative Crop Experiments made with transplanted and biasi paddy for Bemetara Demonstration Centre.

Serial No.	Name of village.	Outturn per acre in lbs.		Increase due to transplantation.
		Transplanted.	*Biasi.*	
		lbs.	lbs.	lbs.
1	Reiwa ...	1,120	930	190
2	Deokar ...	630	300	330
3	Akalwara ...	1,120	700	420
4	Budera ...	1,050	420	630
5	Mohbhatta ...	300	270	30
6	Bhatgaon ...	1,410	1,520	—110
7	Jamgaon ...	2,000	2,000	...
8	Linjwara ...	1,540	1,540	...
9	Tarabum ...	2,450	1,680	770
10	Bhond ...	1,750	1,680	70
11	Hatpan ...	2,030	2,010	20
12	Kusmi ...	4,200	2,100	2,100
13	Anandgaon ...	1,200	1,500	—300
14	Taksiwa ...	2,200	1,800	400

I.—(*f*) BEMETARA.

Statement showing the Results of Comparative Crop Experiments made with transplanted and biasi paddy for Second Demonstration Centre, Bemetara.

Serial No.	Name of village.	Outturn in lbs. per acre.		Increase due to transplantation.
		Transplantation.	*Biasi.*	
1	Bemetara	2,710	1,550	1,160
2	Pikari	1,890	1,050	840
3	Singhori	2,700	1,940	760
4	Kanteli	1,820	1,510	310
5	Ninwa	1,120	950	170
6	Jiwari	3,240	2,190	1,050
7	Amona	1,710	1,650	60
8	Bijabhat	2,050	1,395	655
9	Mataka	1,250	1,120	130
10	Pathara	1,050	1,020	30
11	Jewara	1,610	1,120	490
12	Ruka	1,910	1,810	100
13	Mohrenga	3,550	1,820	1,730
14	Kusmi	3,430	2,000	1,430
15	Bahera I	3,230	2,500	730
16	Pipalbhatta	2,000	1,150	850
17	Mohtara	2,550	1,250	1,300
18	Nawagaon	2,000	1,150	850
19	Bhuwanabhatta	1,500	950	550
20	Bahera II	1,850	1,510	340
21	Gangapur	2,010	1,650	360
22	Kanera	1,520	1,050	470
23	Betas	1,110	1,000	110
24	Bera	2,050	1,670	380
25	Umaria	1,310	1,050	260
26	Udiya	2,182	1,575	607
27	Airamshahi	2,550	1,840	710
28	Mohalain	1,510	1,076	434
29	Gursina	2,720	2,458	262
30	Magarhbhatta	1,516	1,185	331
31	Mohahhatta	2,850	2,080	770

Statement showing the Result of Comparative Crop Experiments made with irrigated and unirrigated paddy.

Name of village.	Outturn per acre in lbs.		Increase due to irrigation.	Kind of soil.	Variety of paddy.
	Irrigated.	Unirrigated.			
BALODA BAZAR CENTRE.					
(*Late paddy.*)					
Khaira ...	2,120	1,360	760	Dorsa matasi ...	Gurmatia.
Pahuda ...	2,040	1,880	160	Do. ...	Do.
Tarma ...	1,380	830	550	Dorsa ghurri ...	Do.
(*Medium paddy.*)					
Khaira ...	1,560	1,080	480	Dorsa matasi ...	Chilakat.
(*Early paddy.*)					
Khaira ...	1,600	920	680	Matasi ...	Kanthasela.
Pahuda ...	1,440	1,160	280	Do. ...	Kuriasela.
Tarma ...	1,760	1,680	80	Do. ...	Do.
Chhuiha ...	1,280	1,440	—160	Do. ...	Kanthasela
PINDRAON CENTRE.					
(*Late paddy*)					
Murra ...	...	1,025	600	...	Gurmatia.
Kurra ...	1,625	...			
(*Medium paddy.*)					
Kurra ...	...	$1,007\frac{9}{13}$	$292\frac{4}{13}$	...	Parewa.
Bangoli ...	1,300	...			
(*Early paddy.*)					
Kurra ...	$1,608\frac{1}{3}$	$828\frac{2}{3}$	$780\frac{5}{21}$	...	Bhaja Gurmatia
KUTHRAIL CENTRE.					
(*Late paddy*).					
Anda ...	2,140	1,280	860	Matasi ...	Gurmatia.
Janjgiri ...	1,760	1,040	720	Do. ...	Do.
Chirpoti ...	1,280	640	640	Do. ...	Do.
(*Medium paddy*).					
Chandkhuri ...	1,600	1,200	400	Do. ...	Chilakat.
Janjgiri ...	1,540	1,000	540	Do. ...	Parewa.
Risama ...	1,070	760	310	Bhata matasi ...	Banko.
Chirpoti ...	900	560	340	Do. ...	Do.
RISALI CENTRE (MR. NARHAR SITARAM).					
(*Late paddy.*)					
Hanoda ...	1,980	2,220	—230	Matasi ...	
Bawali ...	1,715	1,855	—140	Do. ...	
(*Medium paddy.*)					
Potiya ...	1,540	840	700	Bhata matasi ...	
(*Early paddy*).					
Borsi ...	1,750	1,400	350	Matasi ...	
Amadi ...	1,680	1,015	665	Do. ...	

Yield of irrigated versus *unirrigated biasi paddy.*

Name of village.	Variety of paddy.	Class of soil.	Irrigated outturn.	Unirrigated outturn.	Increase due to irrigation.	Decrease due to irrigation.
			lbs.	lbs.	lbs.	lbs.
Late paddy.						
Khaira ...	Gurmatia ...	Dorsa-matasi ...	2,120	1,360	760	...
Pahuda ...	Do. ...	Do. ..	2,040	1,880	160	...
Tarma ...	Do. ...	Dorsa-ghurri ...	1,380	830	550	...
Murra ...	Do. ...	...	...	1,025	600	...
Kurra ...	Do. ...	...	1,625	...		
Anda ...	Do. ...	Matasi ...	2,140	1,280	860	...
Janjgiri ...	Do. ...	Do. ...	1,760	1,040	720	...
Chirpoti ...	Do. ...	Do. ...	1,280	640	640	...
Hanoda ...	...	Do. ...	1,980	2,220	...	230
Bawali ...	...	Do. ...	1,715	1,855	...	140
Medium paddy.						
Khaira ...	Chilakat ...	Dorsa-matasi ...	1,560	1,080	480	...
Kurra ...	Parewa ...	...	...	1,007⅓	292⅔	...
Bangoli ...			1,300	...		
Chandkhari ...	Chilakat ...	Matasi ...	1,600	1,200	400	...
Janjgiri ...	Parewa ...	Do. ...	1,540	1,000	540	...
Risama ..	Banko ...	Bhata-matasi ..	1,070	760	310	...
Chirpoti ...	Do. ...	Do.	900	560	340	...
Potiya ...	...	Do. —	1,540	840	700	...
Early paddy.						
Khaira ...	Kanthasela ...	Matasi ...	1,600	920	680	...
Pahuda ..	Kariasela ...	Do. ...	1,440	1,160	280	...
Tarma ...	Do. ...	Do. ...	1,760	1,680	80	...
Chhuiha ...	Kanthasela ...	Do. ...	1,280	1,440	...	160
Kurra ...	Bhata-gurmatia .	...	1,608⅛	288⅞	780¼⅛	...
Borsi ..	...	Matasi ...	1,750	1,400	350	...
Amadi ...	...	Do. ...	1,680	1,015	665	...

Yield of irrigated versus *unirrigated wheat.*

Crop.	Name of village.	Kind of soil.	Outturn per acre.		Increase or decrease due to irrigation.	
			Irrigated.	Un-irrigated.	Increase	Decrease.
			lbs.	lbs.	lbs.	lbs.
Wheat (pissi) ...	Banarasi ...	...	530	370	160	...
Kathia ...	Kurra ...	...	1,020	530	490	...
Wheat ..	Kolihapuri ...	...	880	510	370	...
	Bhanpuri ...	...	720	390	330	...
	Konari ...	...	960	670	290	...
Pissi ..	Khairbana ...	2nd class kanhar ...	462·5	157·5	305	...
Do. ...	Arjundah ...	Do. ...	429·5	292·5	137	...
Kathia ...	Awandhi ...	1st class dorsa ...	710	582·5	127·5	...
Do. ...	Kosa ...	2nd class kanhar ...	690	475	215	...

Annual Report on the working of the Central Museum, and the Public Rooms, Nagpur.

No. 397, dated Nagpur, the 23rd August 1911.

From—R. J. D. GRAHAM, Esq., M. A., B. SC., Curator, Central Museum, Nagpur,

To—The Director of Agriculture, Central Provinces.

I have the honour to submit a brief Annual Report on the working of the Central Museum, Nagpur, and the Public Rooms during the Financial year ending the 31st March 1911.

I.—FINANCE.

The opening balance at credit of the Museum Fund on the 1st April 1910 was Rs. 1,542-4-4. The donation made by the Government for the year was Rs. 2,700. The amount credited into the Treasury from the 1st April 1910 to the 31st March 1911 came to Rs. 536-13-3, making the total receipts of Rs. 4,779-1-7. The expenditure incurred during the year under the head Contingencies amounted to Rs. 2,268-4-8, and the year closed with a balance of Rs. 2,510-12-11—*vide* details given in Appendix A. The actual expenditure incurred on the payment of the salaries and travelling allowance amounted to Rs. 1,361-8-1 and to Rs. 113-2-0, respectively, against Rs. 3,540 and Rs. 200 provided in the Budget as detailed in Appendix B.

II.—PUBLIC ROOMS FUND.

The Rooms were used 30 times for Theatrical and other purposes as compared with 11 times during the previous year.

III.—INDUSTRIAL SECTION.

This Section, containing as it does the most motley array of exhibits, has been left severely alone. A few of the most dilapidated exhibits have been rejected.

IV.—ARCHÆOLOGICAL SECTION.

On the 16th of February 1911 the services of Pandit Natesan Iyer were secured, firstly to undertake repairs to the monuments at Bheraghat, and secondly to catalogue the archæological exhibits in the Museum. The first work occupied a month, and the descriptive Catalogue of the Archæological Section is now in the Press. The Catalogue is extremely interesting, and a want which has long been felt by visitors will be supplied with its publication. An important discovery of Buddhist remains was made by Pandit Natesan at the village of Gopalpur near Bheraghat. This Section was inspected by Dr. Vogel, Officiating Director-General of Archæology in India, in February, and again by Dr. Spooner, Superintendent, Archæological Survey, Eastern Circle, in April.

V.—NATURAL HISTORY SECTION.

The services of Mr. D'Abreu were obtained on deputation from the Bengal Educational Service on 3rd February 1911. Mr. D'Abreu is a born naturalist, and under his hands the Natural History Section has undergone a great transformation. The old collection has been overhauled, bad specimens have been rejected, good specimens have been named and rearranged in the cases. Eighty-three specimens of bird have been added to the collection, 22 specimens of mamma, and 13 specimens of reptiles. The collecting of this number of specimens alone in five months is worthy of mention, but the preparing and mounting of the specimens, which have been excellent, calls for very special mention. A fieldman in training has been appointed to this Section. Two new features are worthy of note in this Section The first is a collection of birds' eggs, representing 123 species, from Damoh and Saugor, presented by R. C. H. Moss King, Esq., I. C. S.

This collection will form the nucleus of a collection of the eggs of the birds of the Provinces. The second is the exhibition of birds' nests set up in as nearly as possible a natural way.

The work in this Section is full of promise, as the Central Provinces and Berar are second to none from a naturalist's point of view.

VI.—BUILDING.

During the year under report no material alterations were made to the Museum Building, except some repairs to the roof and the construction of a latrine and the fixing of a water-standard for the use of the staff.

VII.—VISITORS.

The total number of male visitors during the year was 72,296; the total number of female visitors was 23,756, making in all 96,052 persons. The average number of visitors per day was 267.

VIII.—NUMISMATICS.

In all 290 coins were presented to the coin cabinet of the Museum during the year from various parts, the details of which are given in Appendix C.

Besides the coins of the cabinet, 141 coins of different metals were for sale, of which 40 were sold and the sale-proceeds, amounting to Rs. 153-7-0, credited into the Treasury.

The work of cataloguing the collection of coins has been taken in hand during this year, and has been done in two sections. The Moghal coins have been identified and catalogued by Munshi M. A. Suboor, the rest having been described by Pandit Natesan Iyer.

A new safe has been purchased to replace the wooden cabinet, which was considered to be unsafe.

IX.—ESTABLISHMENT.

The following changes have been made in the establishment :—

Assistant Curator.—Mr. D'Abreu, Assistant Master, Victoria School, Kurseong, Bengal, has been appointed as a temporary Assistant for the Natural History Section of this Museum, from the 3rd of February 1911, on a salary of Rs. 150 per month.

Assistant Archæologist.—Pandit Natesan Iyer, from the office of the Director-General of Archæology in India, has been appointed as a temporary Assistant Archæologist to catalogue the sculptures in this Museum, from the 16th of February 1911, on a salary of Rs. 150 per month.

Clerk.—The permanent incumbent, Damodar Govind, has been transferred to the office of Director of Agriculture, Central Provinces, and C. Mahadeo Shastri, temporary Museum Clerk, having been transferred to the Comptroller's office on 24th October 1910, C. G. Gokhale, a clerk of the office of the Commissioner, Nagpur Division, was appointed in his place from 25th October 1910. He was subsequently confirmed in his appointment from 1st April 1911.

Servants—The menial staff has been strengthened by the addition of a peon on Rs. 7 per month from 1st March 1911, for the office of the Museum Clerk, making the total number of peons to 8. The peons have been provided with khaki liveries.

General.—The Museum is open from 7 a. m. to 6 p. m. every day, except on Wednesday, on which day it is closed at 12 noon. Until this year no holidays were given to the menial staff.

APPENDIX A.

Showing the Contingent Expenditure incurred during the year ending 31st March 1911.

Serial No.	Details of Heads.	Actual.	Total.
		Rs. a. p.	Rs. a. p.
1	Opening Balance on 1st April 1910 ...	1,542 4 4	
2	Allotment for the year 1910-11 ...	2,700 0 0	
3	Amount credited into the Treasury from 1st April 1910 to 31st March 1911. ...	536 13 3	4,779 1 7
	Expenditure.		
1	Pay of Taxidermist for 1910-11 ...	292 14 8	
2	Travelling allowance ...	161 3 6	
3	Allowance to Clerk for 1910-11 ...	120 0 0	
4	Wages to Mehtar do. ...	30 0 0	
5	Purchase of specimens ...	40 0 0	
6	Purchase of furniture ...	275 0 0	
7	Postage ...	16 0 0	
8	Miscellaneous ...	1,333 2 6	2,268 4 8
	Balance on 31st March 1911 ..	...	2,510 12 11

APPENDIX B.

Showing the Salaries of Establishment of the Central Museum, Nagpur, during the year ending 31st March 1911.

Name of Sub-head and District.	Class of Charge.	Details.	Budget allotment.	Actual.
			Rs. a. p.	Rs. a. p.
26.—Scientific and other Minor Departments, Nagpur.	Salary ...	Archæologist ...	2,400 0 0	214 4 7
	,, ...	Clerk ...	300 0 0	323 3 5
	,, ...	Custodian ...	180 0 0	173 2 0
	,, ...	Servants ...	660 0 0	650 14 1
		Total ...	3,540 0 0	1,361 8 1
	Travelling allowance ...	Archæologist ...	200 0 0	113 2 0
		Total ...	200 0 0	113 2 0

APPENDIX C.

Showing the number of coins received in the Central Museum, Nagpur, during the year ending the 31st March 1911.

Serial No.	Donor's name.	Number of Specimens.				
		Gold.	Silver.	Copper.	Lead	Total.
1	Central Museum, Lahore ...	...	16	...	...	16
2	Secretary to Government of Bengal ...	...	5	...	...	5
3	Government Museum, Madras ...	2	...	...	...	2
4	Superintendent, Archæological Survey, Western Circle, Poona.	2	11	2	...	15
5	Bombay Branch, Royal Asiatic Society, Bombay ...	...	...	...	2	2
6	Deputy Commissioner, Nimar ...	...	9	...	...	9
7	Director of Agriculture, Central Provinces ...	4	146	56	...	206
8	Secretary to Government, United Provinces ..	1	32	2	...	35
	Total ...	9	219	60	2	290

Govt. Press, Nagpur:—No. 1047, Agri.—18-11-11—500.

REPORT

ON THE

AGRICULTURAL STATIONS

IN THE

CENTRAL PROVINCES AND BERAR

FOR

THE YEAR 1912-13.

Ending the 30th June 1913

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REPORT ON THE AGRICULTURAL STATIONS IN THE CENTRAL PROVINCES AND BERAR FOR THE YEAR 1912-13.

Annual Report on the Agricultural College for 1912-13.

STAFF AND ITS WORK.

Subject.	Lecturers.	Work taken.
Agriculture ...	The Principal ...	2nd and 3rd year lectures, practical classes, supervision and demonstration.
	Mr. Phatak, 1st Assistant Lecturer.	One lecture in 2nd and 3rd year. 1st year and 2nd year practical classes.
	Mr. Jiyalal, Farm Superintendent.	3rd year practical field classes.
Botany ...	The Economic Botanist ...	The work in the different years as regards lecture and practical has been shared by them. The Economic Botanist has chiefly controlled the 1st year. Mr. Pandit the 2nd and Mr. Shrivastava the 3rd.
	Mr. K. P. Shrivastava, 1st Assistant Lecturer.	
	Mr. Pandit ...	
Chemistry ...	The Agricultural Chemist ...	
	Mr. A. R. Padmanabhan, 1st Assistant.	2nd year class.
	Mr. Ram Narayan, 2nd Assistant.	1st year class and practical work of the 3rd year.
Physics ...	Chemical 1st Assistant . .	1st year work.
Geology ...	The Principal ...	1st year work.
Entomology ...	Mr. Khare, Assistant Entomologist.	2nd and 3rd year work.
Veterinary Science ..	Mr. Roy, Veterinary Assistant.	2nd and 3rd year work.
Mensuration and Mathematics.	Mr. Phatak ...	1st year and 2nd year.
Survey ...	Mr. Khare ...	2nd year.
Engineering ...	Mr. Phatak ...	Mechanics 3rd year.
	Mr. Cove, School of Handicrafts.	Materials and Machines.
	Lecturer appointed by Public Works Department.	Building construction.
Farm Accounts, management and Economics.	The Principal ...	3rd year.

WORK THROUGHOUT THE YEAR.

Agriculture.

2. The 2nd and 3rd year maintained the courses in which they had been employed in the past. More attention however was given to animal husbandry and dairy management in the 3rd year. The style of field work and the interest shown on the part of the majority of both years was quite satisfactory, and the results of the year as shown in the final were fairly good and in most cases reflected the energy shown during the year. The first year course underwent certain alterations in view

of the changes in the course of study outlined in last year's reports. No lectures were given to this year but the class were given a special course designed to bring out by practical observation and practice the leading principles of scientific agriculture in a simple and elementary manner These demonstrational lessons in the field were alternated with field work. The class was only a small one. The work done by all but about three or four was good. Two of these failures left during the year and two more were disqualified at the end of the same. With some revision the course should prove effective. It will require special care on the part of the Assistant in charge, as it is mainly devised to increase the reasoning and observational capacity of the class, and the direct giving of information—a feature rather too noticeable in Indian Assistants—must be avoided. Mr. Phatak, I think, however, realizes what is required, and I consider that the majority of the class possessed a more intelligent knowledge of the simple principles of Agriculture than any first year I have had at the College A distinct feature was made in all years of the keeping of a detail diary of work done by each student. The management of the demonstrational plots was better than in the past but has still room for further improvement. The appointment of a second College Assistant, under consideration, will however help this.

BOTANICAL SECTION.

General. 3. Each year it is becoming more evident that the connection of the Economic Botanist with the teaching work must largely cease except for general supervision and an occasional short series of lectures to advanced students. This is the natural outcome of other lines of work taken in hand which yearly demand more time, and require the absence of the Economic Botanist from head-quarters.

First year.—The new concentrated time-table for botany was brought into force for the first time with this class. By it students receive three lectures and six hours of practical instruction per week. Practically every day the students receive instruction in botany and the attention of the students has not time to evaporate in the intervals between classes. The new scheme is, as far as botany is concerned, an unqualified success. The class finally consisted of 14 students, of whom nine passed the final examination. Amongst those who passed there are several promising students.

Second year.—Mr. Pandit taught this class until the end of December, the work thereafter being carried on by Mr Kalka Prasad. The practical class was not taught in two divisions as in former years. The work of the class as a whole was only average but this was largely due to the retarding influence of a few students. Six students failed to pass the examination at the end of the year.

Third year.—Mr Kalka Prasad taught the 3rd year class in plant-physiology, while Mr. Pandit took the course in plant-pathology. A short series of lectures in plant breeding was given by the Economic Botanist towards the close of the year In the final examination eight out of sixteen students failed to satisfy the examiners. Further comment is uncalled for. From start to finish of its College course in botany this class has distinguished itself by its carelessness and want of application to the matter in hand.

Physics, 1st year.—A satisfactory year's work was done in this subject, and in the final examination only one student was below pass standard.

Chemistry. Throughout the whole of the three classes there has been too marked a tendency to make a permanent record of laboratory work after class hours instead of during the time work is in progress. This destroys a most valuable part of laboratory training in that students do not learn the importance of making careful records of observations at the time the observations are made; the result being that note books largely follow a set pattern and possess no individuality. Crowded and uncomfortable conditions in the laboratory are largely responsible for this but with improved laboratory accommodation in the future the defect, it is hoped, will be remedied.

On the whole the 1st year class did well, some men particularly so, but the subject is evidently beyond the present capacity of two or three students.

In the 2nd year class, men who were weak and only just succeeded in passing in this subject last year again occupy low positions. One student upon whose work I reported favourably at the end of the 1st year has lost grip and failed badly.

The Agricultural Chemist to the Government of Behar and Orissa, who examined the 3rd year class, reported that the first man on the list was far ahead of the rest and appeared to have a good grasp of the subject. The others were fair throughout with the exception of two men at the bottom of the list who were extremely weak.

The work has been divided between the Agricultural Chemist and two Assistants. Mr. A. R. Padmanabhan has taken the 2nd year class, Mr. Ram Narayan the 1st year class and laboratory work with the 3rd year.

Entomology.

These classes have been under the control of Mr. Khare. An elementary course was given to the 2nd year and a more applied course to the 3rd year. The examiner of the last named year in the final, Mr Fletcher, Imperial Entomologist, stated that he considered that the teaching of this subject showed a marked improvement on that of passed years. The class note books in both years give indications of a careful and well thought out course of study.

Veterinary Science.

This year the 1st year class was not taught this subject in view of the fact that in the 3rd and final year it will be made a subject of prime importance and given closer attention. The 3rd year showed a better knowledge of the subject than has been the case in the past On the other hand the 2nd year as a whole did not show up well in final examination. The work done as shown in the practical note books of both classes is fuller than in passed years. Mr. Roy has, in my opinion, exhibited more regularity and keenness in his College work than has been shown by his predecessors. The failure of the 2nd year to do his work credit is, I am convinced, due to the inclination not to give the subject the full attention in working up for examination it deserves, in that at present it is a minor subject. I feel that the present first year will do better in this subject, as its importance as an examining subject will by then be increased.

Mathematics and Mensuration.

These sections have been in the charge of Mr. Phatak. Both form weak points in the College course and must get closer attention. The time devoted to the subject in the 1st year has been increased and I think on the whole that the standard has been slightly improved. The second year did not show up well. The elementary mathematics of many passed matriculates appears uncommonly weak, and few possess much idea of the application of simple mathematics to practical facts.

Survey.

I consider that the teaching and actual field-work done by the 2nd year to whom this course was given has been fuller and more complete in character than in the past. A good deal of the work examined by me during the year has shown care and knowledge. I was therefore surprised at the rather poor effort made by a very fair body of the class in the examination paper I set. Several of those who have been permitted to pass to the 3rd year will have to reappear in July and prove their ability in this subject or revert.

Engineering.

This subject taken in the 3rd year was of a mixed kind. The bulk of the subject was taught by Mr. Phatak—a course of mechanics and simple instruction on steam and oil engines and farm machines. In addition two useful short courses were given; the one in building construction, estimates and plans of simple character as required on a farm, the other a course given by Mr. Cove, of the School of Handicrafts, on materials, simple tools and their uses, simple machines and the methods of description in indenting for parts. Both the short courses were fully illustrated by practical demonstrations. Mr. Cove's course might with advantage be

increased in length next year. He remarks on the very hazy idea most of the men showed in understanding sectional and plan drawings of machinery. Mr. Phatak is now well equipped with working models to illustrate the theory which he teaches.

Geology.

The first year class took a keen interest in this subject. It was taught as little as possible in the form of direct lecture, but more as a school lesson. With this year in particular I am of the opinion that the lecture type of instilling knowledge should be avoided. It is no doubt more difficult to teach than to lecture; but the former, with men who are new to science and often one may say, new to English, is distinctly more desirable.

Agricultural Economics, Management and Accounts and Land Laws.

This course is a difficult one to accomplish suitably in the time available for it. The first three can be managed, but for the last students in future will have to depend largely on the information contained in Mr. Low's book on the subject.

College Students.

The entry this year was of a most unsatisfactory type. An apparently exceptionally agricultural connected set of men, chiefly from the Central Provinces and Central India, were selected from among the many applicants who applied, and there was every sign of a record year both in the character of the men and in their capacities. Of the 36 who were accepted in the preliminary selection, several did not come, the usual few failed to stand the field-trial tests, and a number came, passed these tests, were accepted and then for no accountable reason left without warning; the result was that the classes opened in a settled condition with only 18 men as against 24-25 in the past. Of this four left or were got rid of later in the term, as unsuited to the course, reducing the year to only 14 by the Devali break.

The numbers may be stated as below :—

	At beginning of the year.	Appeared for examination.
First year	18	14
Second year	20	20
Third year	16	16
Total ...	54	50

These figures compare with 60 and 59 in 1911-12.

The following table affords an analysis of the areas whence students on College books last year were drawn :—

		Central Provinces and Berar.	Central India.	United Provinces and Bengal.	Other places.
First year	18 ...	13	2	...	3
Second year	20 ...	14	2	2	2
Third year	16 ...	10	1	4	1
Total ...		37	5	6	6

Local men thus form 71 per cent as against 63 per cent last year.

Every effort is made to get men from the true cultivating classes but the larger majority of those who apply and who may be accurately said to come from the land are of low educational standing. The College standard of entry is the School leaving certificate or University Matriculation. Experience has shown, year after year, and it is more in evidence than usual in the late examinations, that unless a man has reached this standard his chance of getting through the College course is almost negligible. The chief sources of stumbling are the scientific subjects, Chemistry and Botany, and in many cases Mathematics. Unless a man has reached the entry standard above, his knowledge of English and the rapidity with which he can assimilate what he hears in lecture are at fault. Every year I consider many applications from cultivator's or malguzar's sons who are not matriculates, many of whom apply with the intention of taking up farming on their own land. It is impossible to give all a trial. Favour is shown to two or three of the most apparently deserving examples, but almost always the same thing happens—failure in examinations. The main entry standard cannot be reduced below that which it is now. Nor can the standard in the College be reduced without lowering the value of the College degree, which I cannot permit, as undoubtedly unless the best class of man is qualified to hold the College degree, we cannot expect to get the standard required for our Provincial Service. I am driven back to proposals which I have already submitted, *i. e.*, (1) the opening of a course in English for the sons of men who are here purely to learn Agriculture and have no intention of Government service and who are non-Matriculates. I do not think I would give these scholarships. The lessons of the late Malguzari class are against this. The course would contain sufficient popular science to make the chief features of Agricultural practice understandable but would be chiefly of Agricultural and practical utility. (2) The adoption of a four year course in the College with Agriculture and Agricultural practice in the first two years, followed by an elimination at this point of those who came for private reasons or the unfit and finally a devotion of the last years to a scientific study of the subject. This has been adopted recently in Madras. As, however, we have recently made a change in the type and features of the course, it is not reasonable to adopt this radical change in the College course without giving the present one a trial. The present course, however, in order to make the College more useful to the landowning classes requires a secondary course as outlined in (1) to make the Collge work complete. The scheme now under consideration to raise the standard of education of selected boys, by giving them scholarships to enable them to reach the College standard at school, is a sound one and may make it possible to get more of the class we want into the College. During the last year we may take it that of the 54 students who were definitely in the College books 25 possessed a good claim to be considered as closely connected with the land. Of these, 12 were included in the 1st year.

Conduct and Discipline.

Discipline has been well maintained in the class and on the field. No cases of disobedience to orders were reported. A method of class marking in practical work, which was taken into consideration in the final, was introduced during the year and had some effect in checking irregularity and slackness. It will be introduced more fully during the coming year.

Tours.

The usual tours to Raipur, Akola and Hoshangabad were taken this year. Only the 3rd year went. It was intended to take this year to Jubbulpore; but this was found to be impossible. Better work was done by a small party of 3rd year men than when two years were, taken together as in the past. I propose to extend these tours to include other districts this coming year. Negotiations are on foot to permit of concessions being granted by the Railway companies to enable the party to proceed by better accommodation than is afforded by 3rd class in passenger trains

College Buildings and Fittings.

Little can be written on the subject. The College Laboratories are again in the course of construction and show signs at last of being in a fair way to finally reaching completion.

The arrangement whereby the Victoria College of Science will shortly vacate the Victoria Technical Institute and permit this to become the offices of the Department of Agriculture and Industries and the lecture room section of the College, will cause the consolidation of all Agricultural interests in one area.

The College Gymnasium has been completed and fitted and the new latrines opened. Servants' quarters are in course of construction. When completed they will permit of the removal of the unsightly temporary huts in the vicinity of the Hostel. I consider that the next piece of improvement work in the College area lies in the rough levelling and sloping of the area between the Victoria Technical Institute and Hostel and the nullah. To date it has been a no-man's land and has looked it. A little of the above work and an orderly planting out of the area with trees would considerably enhance its appearance.

The examination of 1913 and the results.

The annual examinations were held between the 12th and 29th of March On the whole the results approximated very closely with the general estimate arrived at during the term and based on the monthly marks and reports. I am inclined to consider that the standard as shown in examinations by the 3rd year was somewhat higher than I had expected of them as judged by their 2nd year results, and I think that, though not a 1st class year, they have done fairly creditably. The 2nd year fell somewhat below my anticipation, while the first eight or nine students in the 1st year appear to be a capable lot and show some promise of doing well.

Agriculture.

Examiners—

1st year	Theory	... ...	The Principal.
	Practice	... ...	The Principal and Farm Superintendent.
2nd year	Theory	... ...	Mr. D. Clouston, Deputy Director of Agriculture and the Principal.
	Practice	... ...	
3rd year	Theory	... ...	Mr. Knight (Poona), Mr. Clouston and the Principal.
	Practice	... ...	Mr. Knight and Mr. Clouston.

Chemistry.

1st and 2nd years	...	... ...	The Agricultural Chemist.
3rd year	...	... ...	Mr. Somerville Taylor (Bengal).

Botany.

1st and 2nd years	...	... ...	The Economic Botanist.
3rd year	...	... ...	Mr. Wilson (United Provinces).

Veterinary.

2nd and 3rd years	...	... ...	Major Baldrey, Superintendent, Civil Veterinary Department.

Entomology.

2nd year	...	... ...	Mr. Khare (Entomological Assistant).
3rd year	...	... ...	Mr. Bainbrigge Fletcher (Madras).

Engineering.

3rd year	... ...	Mr. Cove (School of Handicrafts). Mr. Ghate (Public Work Department). Mr. Phatak (1st Assistant).

Physics.

1st year	... ...	The Agricultural Chemist.

Geology.

1st year	... ...	The Principal.

Farm Economy and Management.

3rd year	... ...	The Principal.

Mathematics, Mensuration and Survey.

1st year	... ...	The first Agricultural Assistant.
2nd year	... ...	The Principal and the 1st Assistant.

RESULTS.

First Year.

Total examined.	1st Class over 60 per cent.	2nd Class over 50 per cent.	3rd Class over 45 per cent.	Failures.
14	5	2	2	5

None of the men who failed showed much promise of better things. One is a failure for the second time and another is hopelessly inefficient. Neither will be allowed to repeat the year.

Taking the subjects in detail they may be expressed in tabular form—

Section.	Total examined.	1st Class.	2nd Class.	3rd Class.	Failures.
1	2	3	4	5	6
Agriculture	14	6	5	1	2
Chemistry	14	4	4	1	5
Botany	14	4	2	3	5
Minor Subjects	14	4	2	4	4

Agriculture was on the whole done well. The class showed a better reasoning power than usual and the field work was quite satisfactory. Men as a rule do better in this subject than in the more scientific ones.

Chemistry is reported on as being quite satisfactory in its results. Some men were good and two or three hopelessly incapable.

Botany.—With the exception of the five incapables the results shown were well up to average.

Minor subjects consist of Geology, Mathematics and Physics. Veterinary Science used to be included, but is now commenced in the 2nd year. Geology and Physics were quite decently done. The greatest signs of weakness were shown in Mathematics. Those who failed in this subject were very bad indeed.

Second Year.

Total examined.	1st Class.	2nd Class.	Failures.
20	2	11	7

Of those who failed two were men repeating the course. One man did respectably in other subjects, but failed badly in Chemistry, largely due to sheer slackness in term.

Most failures occurred in Botany and Minor Subjects. The latter were distinctly badly done, even by some who did well elsewhere.

The following are the sections of the examination in detail :—

Section.	Number examined.	1st Class.	2nd Class.	3rd Class.	Failures.
1	2	3	4	5	6
Agriculture	20	8	11	...	1
Chemistry	20	4	5	4	7
Botany	20	...	8	6	6
Minor Subjects	20	...	2	10	8

Agriculture was above the average. The class seem to have worked at this specially. The paper and practical were both well done. Mr. Clouston considered them a much better lot than last year. The only failure was a man making his second attempt.

Chemistry.—There was one specially good paper. Three of the failures were distinctly poor. The general results may be described as average.

Botany was rather poor; several of the 3rd class passes had to be given every mark available to permit them to pass.

Minor Subjects.—These in this year comprised Survey, Entomology and Veterinary Science. The second was respectably though not brilliantly done. The Veterinary Examiner expressed his opinion that the results shown in this year were as a whole below the average. Mensuration and Survey were distinctly second rate. I was surprised at the latter in that the work throughout the year had been more systematic. Our men are almost invariably weak in anything relating to Mathematics. The course and its method of teaching must be subjected to revision. As it is essential that men must qualify in this subject, all those who failed in this subject but secured a pass in Minor Subjects as a whole will have to reappear in July and qualify or revert again to the 2nd year.

Third Year.

Number examined.	1st Division.	2nd Division.	Failures.
16	1	12	3

This year did better than was expected of them. One man is however considerably above the rest. This is, as was expected, as he has invariably been in this position throughout the course. Of the three who failed one did so in three sections and the other two in two sections of the examination. The last three passes were just able to meet requirements. One of these was repeating the examination and should have done better. The last pass intended cultivating his own property and as this was the case and as he just managed to fulfil the standards required, he was allowed to pass.

The following are the details of each section :—

Section.	Number examined.	1st Class.	2nd Class.	3rd Class.	Failures.
1	2	3	4	5	6
Agriculture	16	2	10	3	1
Botany	16	2	7	4	3
Chemistry	16	4	8	2	2
Minor Subjects	16	1	6	5	3

Agriculture.—The paper set by the outside Examiner was somewhat easier than last year, while that set by the home Examiners was harder. Except in two cases the papers were however respectably done. The practical work I consider should have been better. A number of idiotic mistakes were made, in the main section of this conducted by Mr. Knight, by men who had done the actual piece of work asked for quite satisfactorily during the year. Three in particular who had worked well during the year did poorly. Several were only saved by the value of their sessions work.

Botany.—The Examiner expressed his opinion that the standard shown by the class as a whole was above what he had expected. The marks awarded for the character of work during the year approximated fairly closely to the merit shown in examination, though in two or three cases they had the effect of giving men near the margin of failure a right to be considered as passed.

Chemistry.—The paper was satisfactorily done. The two who failed were distinctly below the rest. One of the first class papers was distinctly good.

Minor Subjects—embraced Veterinary Science, Engineering, Entomology and Agricultural Economics and Accounts. The Examiner in Veterinary Science considered that the class was above the average in the past though several showed a lack of animal handling. Entomology was distinctly good and the Examiner expressed his opinion that the teaching and the work appeared to show a very considerable improvement on last year. Agricultural Economics was only done fairly well. Five papers were poor. Engineering was also not as well done as it should have been. I attribute this partly to a general weakness in Mathematics and partly to the fact that as a minor subject, considered with three others, it is apt not to get the preparation and attention which it should, as a man who feels somewhat weak is likely to concentrate his energies on scoring as much as he can on the subjects he feels good at. The new scheme, whereby in the 3rd year Farm Engineering and Veterinary rank as first class subjects with Agriculture, will probably cause both these to show an improved standard of excellence.

PRIZE WINNERS.

Third Year.

Director's Prize for the best student of the year	...	D. V. Bal.
The Smythe Medal for Chemistry	...	D. V. Bal.
The Chowdhari Medal for Agriculture	...	D. V. Bal.
The Minor Subject Special Prize	...	D. V. Bal.

Second Year.

Class Prize	...	R. K. Prasad.
Chemistry and Botany Special	...	L. V. Ghate.
Minor Subjects	...	R. K. Prasad.
Principal's Prize for Practical Agriculture	...	G. B. Deshmukh.

First Year.

Class Prize	...	V. S. Pillay.
Chemistry and Botany Special	...	V. S. Pillay.
Minor Subjects Special	...	G. Bengali.
Principal's Prize for Agriculture	...	Yar Mahommed.

Hostel.

The Hostel has been under the charge of Mr. Kalka Prasad, Assistant Botanist. He has fulfilled his duties in a thoroughly efficient manner both with regard to the maintenance of discipline and to the up-keep and control of the Hostel premises. All the Hostel is now stone floored.

Buildings and Fittings.

With the construction of servants' quarters behind the Hostel, the much needed godown space will be available. It will thus be possible to fit out a thoroughly efficient sick-room in the place of the present makeshift arrangement. This will be undertaken this year. I am of the opinion that it is advisable to consider the lighting of the Hostel with electric light. Except from the possibilities of damage through carelessness on the part of students, I think that these lights will cost less to run and at the same time give the Superintendent a better control of the "Lights out" rule.

Health.

This has, on the whole, been excellent. Apart from a few slight cases of fever and one case of very mild chicken-pox, there has been nothing worth consideration.

College Agricultural Association.

This Association held a number of meetings during the year. Papers were read by students on different subjects pertaining to Agriculture. Several of these showed considerable trouble and care. Interest was well maintained. In order to encourage students to prepare and read such papers I intend to introduce a prize for the paper which I consider most carefully compiled and constructed.

College Games.

The new Gymnasium was completed in the beginning of the cold weather and was well patronized. It should form a useful outlet in the rains. Cricket and Hockey were played in their seasons and a certain amount of interest was shown in both; there is however not the keenness there should be if a small College like this one is to compare favourably with the larger educational establishments in the locality. Students as a whole do not practise sufficiently to make good the effect of small numbers and a smaller choice of naturally good men. The inter-Collegiate Hockey Tournament helps, but its effect is somewhat short-lived. Though in cricket one or two of the Assistants show some interest at net-practice, their inability at Hockey makes a greater claim on the Principal than he can manage. This year more interest was shown in athletics, the result of a shield offered for competition amongst the Nagpur Colleges. This College scored 31 points as compared with 37 scored by the winners and stood third. The College ground leaves much to be desired. Of the annual grant of Rs. 250 only a small sum is available for upkeep. A much larger sum is necessary in the form of a special grant in order to make the black cotton soil of the field in the least really suitable.

The College Day.

This was held on the 21st and 23rd of December. On the first named the annual dramatic entertainment was given under the auspices of the National Indian Association. It came at an awkward time, between Mohurram and Christmas. As a result the house

witnessing the performance was not up to that in the past. The performance itself consisted of extracts from "The Twelfth Night" and "The Rivals" and a Marathi version of "The Taming of the Shrew".

Speech day was held on the 23rd. Mr. A. G. Wright, Director of Public Instruction, kindly presided and gave away the certificates of Licenciate of Agriculture and the prizes. Several old boys were present.

Financial Statement. This is shown in the Appendix.

APPENDIX I.

The results of the Examinations.

3RD YEAR.

Name.	Total out of 1,000.	Place.	Class.	Remarks.
1	2	3	4	5
D. V. Bal	738	1	1st.	Director's Prize, Chowdhari and Smythe medals.
Bhagwandas K. Mali	579	2	2nd.	
D. N. Maitra	573	3	do.	
K. C. Guha	565	4	do.	
N. N. Dutt	565		do.	
M. Jamkhindikar	552	6	do.	
Balak Das	550	7	do.	
D. V. Sahasrabhojane	540	8	do.	
S. R. Ambikar	531	9	do.	
M. T. Suranglikar	519	10	do.	
A. W. Chandekar	510	11	do.	
N. S. Gangakhedkar	506	12	do.	
A. B. Shrikhande	504	13	do.	
Kartarsingh	473	14	Failure.	In Botany, Chemistry and Agricultural paper.
S. H. Bennur	447	15	do.	In Botany and Agricultural Practical.
H. Banerji	424	16	do.	In Agriculture, Botany and Minor Subjects.

APPENDIX I.—(*Concld.*)

2ND YEAR.

Name.	Total out of 625.	Place.	Class.	Remarks.
1	2	3	4	5
R. K. Prasad	404	1	1st.	Class Prize and Minor Subjects.
L. V. Ghate	391	2	do.	Chemistry and Botany Special.
H. S. Sanyal	360	3	2nd.	
K. S. Pillay	357	4	do.	
Chunnilal G. Shah	351	5	do.	
S. C. Roy	346	6	do.	
S. P. Thapak	335	7	do.	
G. B. Deshmukh	333	8	do.	Agricultural Prize.
A. H. Barde	329	9	do.	
D. Sen Gupta	326	10	do.	
T. B. Rairikar	325	11	Failure.	In Chemistry.
G. M. Deshpande	314	12	2nd.	
N. N. Thampy	314			
S. Daud Ebrahimji	300	14	do.	
K. V. Ghanote	303	15	Failure.	In Botany, Practical Agriculture.
R. S. Pimpalkhare	302	16	do.	In Botany, Chemistry and Minor Subjects.
B. Prasad	298	17	do.	In Botany and Chemistry.
Hasan S. Syd	294	18	do.	Do. do.
Abdul Aziz	291	19	do.	In Botany, Chemistry and Minor Subjects.
R. G. Pant Vaidya	288	20	do.	In all subjects.

1ST YEAR.

Name.	Marks out of 575.	Place.	Class.	Remarks.
1	2	3	4	5
Pillay	428	1	1st.	Class Prize and Chemistry and Botany.
Bengali	398	2	do.	Minor Subjects prize.
Yar Mahommed	378	3	do.	Agricultural Prize.
Gokhle	374	4	do.	
Deodhar	347	5	do.	
S. N. Chowdheri	306	6	2nd.	
Kalvit	294	7	do.	
J. K. Chowdhari	276	8	do.	
Bhagwat	273	9	do.	
Zahid Ali	248	10	Failure	In Chemistry and Minor Subjects.
Patwardhan	248		do.	In Botany and Minor Subjects.
Hashmatullah	235	12	do.	In Agriculture, Chemistry and Botany.
Borgaonkar	235		do.	In Chemistry, Botany and Minor Subjects.
Rout	189	14	do.	In all subjects.

STATEMENT.—Showing the particulars of English Classes for 1912-13.

Classes.	No. on the roll.	Average daily attendance.	Average on the roll.	Classification according to creed and race.						Classification according to caste.			Districts from which recruited.						Age of pupils.			Present occupation.							Remarks.
				Muhammadans.	Hindus.			Others.	Total.	Brahmins.	Others.	Total.	Bengal and the United Provinces.	Berar.	Central Provinces.	Native States.	Rest of India.	Total.	Maximum.	Minimum.	Average.	Government service.	Private service.	Profession.	Trade.	Agriculture.	Miscellaneous.	Total.	
					Bengali.	Marathas.	Northern Hindus.																						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
3rd Year ...	16	15·80	16	...	4	9	...	3	16	9	7	16	4	5	5	2	...	16	24	20	22	5	1	3	...	6	1	6	
2nd Year ...	20	19·70	20	3	3	9	...	5	20	8	12	20	2	2	12	2	2	20	23	19	20	6	4	3	2	5	...	20	
1st Year ...	14	13·89	16	3	2	7	...	2	14	7	7	14	...	2	7	1	4	14	20	16	17	6	...	1	...	7	...	14	

Financial Statement of the Agricultural College, Nagpur, for the year 1912-13.

Serial No.	Heads of Expenditure.	Amount.	Total.	Grand Total.	Remarks.
1	2	3	4	5	6
		Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	Cost of College Establishment ...	5,264 15 2			
2	Cost of Hostel Establishment Contingent charges ...	1,358 2 10	6,623 2 0		
1	Purchase of furniture and apparatus ...	2,122 6 11			
2	Petty construction and repairs ...	687 3 10			
3	Game's money ...	250 0 0			
4	Books for the Hostel Library ...	150 0 0			
5	Other charges ...	2,422 13 10	5,632 8 7		
	Total ...			12,255 10 7	

R. G. ALLAN,

Principal, Agricultural College.

NAGPUR

GOVT. EXPERIMENTAL FARM

Scale 16 Inches to one Mile

To V.T.I
To Maharaj Baf Garden
To Nagpur
Maharaj Baf Vegetable Garden
Nursery
Nursery
Nursery

Annual Report on the Nagpur College Farm for the year 1912-13.

General.

Educational, experimental and plant trial and selection work have been conducted on much the same lines as last year. During the year under report, the College Dairy has been firmly established and an investigation on Sewage farming has been commenced. Both these sections are dealt with separately later in this report. Feeding experiments have been conducted both among the work stock and at the dairy. The farm has, throughout the year, been under Mr. Jiyalal, who has acted as Superintendent in a keen and efficient manner. The dairy section was for the first six months under V. Roy and the rest of the period under the control of J. V. Takle. N. G. Sule has been the Farm Overseer and knows his work.

Improvements.

The dairy cow-shed has been finished and a milking yard made near it. The usual struggle with *Kans*, *Kunda*, *Dub* and *Nagarmotha* has been continued with varying success. In some fields, however, the three first named have been to a large extent eradicated. A certain amount of *bunding* and surface drainage has been done. In one field, suitable for cotton but for a small area where water tends to accumulate, a small under-drainage system has been laid down experimentally. By cutting back one of the tributary nullahs, leading into Ambajheri nullah, it has now become possible to continue irrigation up to end of April over an area of some 5 to 6 acres in extent on the Lendra Farm, a factor of some considerable value in maintaining the green fodder supply of the milch stock. The establishment of the dairy farm has necessitated an alteration of the cropping scheme of the farm, to allow of a full supply of fodder for the increased live stock. The whole farm outside the experimental and breeding areas is now under an organized cropping rotation.

Character of the season.

The season of 1912-13, was marked (1) by the very late arrival of the monsoon, no rain worth considering being received up to the 4th July; (2) by the concentration of almost the total precipitation of the year into the next three weeks; (3) by the fortunate fall of some 2½ inches of rain in the latter half of September which saved a situation which was rapidly becoming serious. Though a certain amount of seed had been sown in dry beds, a practice which it appears to me can only be termed good, when the fields sown are known to be approximately free of weeds and the monsoon is very seriously delayed, the lateness of the first rains delayed the sowing and germination of cotton and *juar*, while the almost continuous rain experienced in the latter half of July and the three first weeks of August prevented weeding and checked the growth of both the fodder crops and cotton. If it had not been for the application of a light top-dressing of calcium nitrate given about the third week in August to the latter, the returns would have been small. This top-dressing, however, had an excellent and thoroughly paying effect. So unpromising were the forecasts for the latter portion of the monsoon in the end of August and early September, that orders were issued to concentrate cultivation on the better *rabi* fields, with the intention of fallowing the remainder. The fall of 2½ inches in September changed the outlook and the rabi returns, especially in the cases of gram and linseed, were quite up to the average if not slightly above it, while *juar* and cotton were greatly benefited by what might be termed a very lucky and unlooked for shower. The cold weather has been particularly dry; deep ploughing has only been resorted to in the preparation for 1913-14 in cases where it was absolutely essential. A fairly large area on which it was intended this should be done has not been touched, as the cost would have been much in excess of any value gained.

Rainfall, 1912-13.

Month.	No. of rainy days.	Rainfall.	Average of the preceding 38 years.	Remarks.
1	2	3	4	5
1912.		Inches.	Inches.	
June ... 1st Half ...	2	·50	2·60	Monsoon commenced on 4th July 1912.
June ... 2nd „ ...	1	·28	5·46	
July ... 1st „ ...	4	4·21	6·59	
July ... 2nd „ ...	12	9·85	7·11	
August ... 1st „ ...	8	13·44	7·42	
August ... 2nd „ ...	4	3·61	6·01	
September ... 1st „ ...	1	·80	5·47	
September ... 2nd „ ...	2	2·67	4·53	
October .. 1st „ ...	...	...	3·47	
October .. 2nd „ ...	..	...	·99	
November ... 1st „ ...	...	...	1·02	
November ... 2nd „ ...	1	·48	48	
December ... 1st „ ...	...	...	·68	
December ... 2nd „ ...	...	...	·10	
1913.				
January ... 1st Half ...	..	...	·36	
January ... 2nd „ ...	...	...	·25	
February ... 1st „ ...	...	·11	·18	
February ... 2nd „ ...	1	·14	·19	
March ... 1st „ ...	1	·14	·17	
March ... 2nd „ ...	...	...	·18	
April ... 1st „ ...	...	...	·12	
April ... 2nd „ ...	...	...	·28	
May ... 1st „ ...	...	...	·17	
May ... 2nd „ ...	...	...	·27	
Total ...	...	36·23	54·10	

SERIES L.—SUBJECT.—To test the value of artificial manures for cotton.

Area of each plot is ·10 acres.

Plot I — Calcium Nitrate = 20 lbs. nitrogen.
Superphosphate = 50 lbs.
Sulphate of potash = 35 lbs.

„ II — Do. without Sulphate of potash.

„ III — Do. do. Superphosphate.

„ IV — Do. do. Superphosphate and sulphate of potash.

„ V — Do. do. Calcium Nitrate.

Plot VI — Sulphate of ammonia only = 20 lbs. nitrogen.

,, VII — Superphosphate.

,, VIII — Unmanured.

No. of plot.	Outturn per acre. Average 1906-07 to 1910-11. Lint.	Seed.	1911-12. Lint.	Seed.	1912-13. Lint.	Seed.	Value of produce.	Cost of manure.	Gross value deducting cost of manure.
1	2	3	4	5	6	7	8	9	10
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	200	367	200	389	230	437	100 10 9	47 3 5	53 7 4
II ...	180	333	192	374	260	491	113 11 5	41 8 3	72 3 2
III ...	197	360	195	379	240	477	105 9 10	24 11 2	80 14 8
IV ...	182	342	189	368	260	515	114 6 6	19 0 0	95 6 6
V ...	119	219	126	246	130	261	53 1 10	28 3 5	24 14 5
VI ...	79	143	182	354	130	238	52 1 6	11 12 7	40 4 11
VII ...	97	180	113	220	120	227	52 7 11	22 8 3	29 15 8
VIII ...	97	176	112	219	110	230	48 12 0	...	48 12 0

The value of nitrogen as calcium nitrate is well marked. Applied as a top-dressing in the third week of August the effect this year is particularly pronounced. The enhanced yields and money returns of the first four plots appear to be entirely due to the effect of the top-dressing of readily available nitrogen.

SERIES M.—SUBJECT.—To determine the comparative value of cattle dung and urine as manures, the urine being conserved by the dry-earth system.

Area of each plot is ·08 acre.

Plot I—Dung and urine of two bullocks for 30 days conserved by dry earth.

,, II—Dry excreta alone of two bullocks for 30 days.

,, III—Urine alone of two bullocks for 30 days conserved in dry earth.

,, IV—No manure.

,, V—Same as plot I.

,, VI— Do. II.

,, VII— Do. III.

CROP—WHEAT.

No. of Plot.	Outturn per acre.							
	Average 1906-07 to 1910-11.			1911-12.			1912-13	
	Juar fodder.	Wheat grain.	Wheat straw.	Juar fodder.	Wheat grain.	Wheat straw.	Grain.	Straw.
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
I ...	4,358	447	585	8,462	362	462	981	1,018
II ...	4,167	336	464	5,600	337	375	937	975
III ...	4,623	359	485	7,150	200	250	843	981
IV ...	2,858	313	419	3,250	125	150	725	800
V ...	4,454	462	572	6,262	337	462	1,031	1,231
VI ...	3,805	382	502	4,387	225	275	887	950
VII ..	3,795	384	482	5,825	175	287	818	825

In the year under report sorghum was not grown as a catch crop before wheat, as the land required cleaning. The experiment bears out the value of the dry-earth system in adding to the value of the manure of a pair of bullocks and indicates that wheat returns can be distinctly improved even in dry cropping by the addition of light dressings of urine and dung to the land, applied as in this case early in the monsoon.

SERIES E.—SUBJECT.—Effect of tillage to various de pths on wheat grown continuously.

Area of each plot is ·25 acre.

Plot I—Scarified (bakhared) every year.

,, II—Ploughed once with country plough and scarified.

,, III—Ploughed with inversion plough scarified.

No. of Plot.	Outturn per acre.								Cost of special treatment per acre over that bakhar.	Cost of cultivation per acre.	Value of produce per acre.
	Average 1901-02 to 1905-06.		Average 1906-07 to 1910-11.		1911-12.		1912-13.				
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8	9	10	11	12
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	573	707	533	778	596	704	429	488	...	17 8 0	23 3 8
II ...	655	819	599	893	704	752	406	456	0 8 0	18 0 0	21 15 6
III ...	689	905	620	928	736	776	550	562	0 12 8	18 4 8	29 8 11

In a year of total low rainfall the value of deeper cultivation at the beginni of the rains at a comparatively low additional cost is amply proved to be good practice in the case of wheat. Deep cultivation on rabi soils in the hot weather is considerably harder than in the case of land which has previously carried a kharif crop, and is in most years more costly than any added returns which the exposure of the soil to the influence of heat on the soil flora can justify in regular practice. An increase of the soil, capacity to absorb and hold the monsoon rain appears to be the chief consideration. A soil ploughed after a fall of rain is a more effective sponge than either land bakhared or ploughed in the hot weather.

SERIES I-B.—Tillage experiments with rotation.

Area of each plot ·10 acre.

	First year.		Second year.		
Plot	I— Cotton	...	Juar	...	Ordinary tillage and no manure.
„	II— Do.	...	do.	...	Frequent tillage and no manure.
„	III— Do.	...	do.	...	Ordinary tillage with farm-yard manure.
„	IV— Do.	...	do.	...	Ploughing first and then frequent cultivation.

No. of plot.	Outturn per acre.									Value of produce per acre.
	1910-11.			1911-12			1912-13.			
	Crop.	Lint.	Seed.	Crop.	Grain.	Karbi (fodder).	Crop.	Lint.	Seed.	
1	2	3	4	5	6	7	8	9	10	11
		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.
V ...	Cotton	80	174	Juar.	925	5,142	Cotton.	220	437	96 13 6
VI ...	do.	80	173	do.	745	5,635	do.	190	383	83 12 9
VII ...	do.	60	100	do.	771	4,645	do.	280	560	123 5 11
VIII ...	do.	140	250	do.	970	5,664	do.	210	405	92 1 11

The germination in Plot II was somewhat irregular. The chief difficulty in an experiment like this one is to ensure that the greater frequency of cultivation in Pots II and IV is carried out with a due regard to the climatic conditions prevailing. Mere frequency without thought on the part of a Superintendent cannot possibly have any advantageous effect.

SERIES F.—Tillage experiments on rabi crops.

Area of each plot is ·15 acre.

Plot I—Ordinary cultivation.

„ II—Frequent tillage with the bakhar.

„ III—Ordinary tillage with manure in wheat years.

„ IV—Ploughing in May and reploughed in end of August and frequent bakharings.

Rotation—Wheat two years and gram one.

Crop—Gram in year under report.

No. of Plot.	Outturn of wheat per acre.		Outturn of gram per acre.				Value of produce per acre.
	Grain	Straw.	Grain.	Straw.	Grain.	Chaff.	
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.
I ...	727	800	907	1,000	936	1,156	41 1 0
II ...	619	721	940	987	903	1,063	39 7 3
III ...	706	731	1,073	1,200	966	1,200	42 6 5
IV ...	630	702	1,053	1,253	1,086	1,193	47 2 10

The rainfall in the last weeks of the monsoon is particulary valuable for the succeeding rabi crop. This is probably why the last plot shows an advantage. This coming year Plot II will receive one ploughing in hot weather and afterwards frequent bakharing in order to compare it more accurately with Plot IV ploughed twice.

SERIES I-C.—Spacing experiment in a rotation of kharif crops.

Area of each plot ·10 acre.

	First year.	Second year.	
Plot I—	Juar	Cotton	Seed sown with *tifan* in lines 12 inches apart and 6 inches between plants.
„ II—	Do.	do.	Seed sown with *argada* in lines 18 inches apart and distance between plants 6 inches.
„ III—	Do.	do.	Seed sown with *argada* in lines 18 inches apart and distance between plants 12 inches.
„ IV—	Do.	do.	Seed sown with *argada* in lines 18 inches apart and distance between plants 18 inches.

No. of plot.	Outturn per acre.									Value of produce per acre
	1910-11.			1911-12.			1912-13.			
	Crop.	Grain.	Karbi. (fodder).	Crop.	Lint.	Seed.	Crop.	Juar.	Karbi (fodder).	
1	2	3	4	5	6	7	8	9	10	11
		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.
IX ...	Juar	495	6,832	Cotton	204	396	Juar	1,342	4,430	124 12 0
X ...	do.	962	5,032	do.	251	487	do.	1,115	4,170	112 1 2
XI ...	do.	750	2,330	do.	212	412	do.	1,190	3,270	99 3 3
XII ...	do.	610	2,095	do.	188	366	do.	1,029	2,876	86 9 11

The return of grain in Plot IX is heavier than the closeness of sowing would be expected to give.

SERIES H.—The effect of interculture and spacing on rabi crop.

Area of each plot is ·29 acre.

Plot I—Sown with ordinary *tifan* 12 inches apart.

„ II—Sown with a *tifan* 18 inches apart.

„ III—Like first plot, but half seed rate of the first.

„ IV—Like second plot, but half seed rate of the second.

Crop—Gram in year under report.

No. of Plot.	Outturn of wheat per acre.				Outturn of gram per acre.		Value of produce per acre.	Remarks.
	1910-11.		1911-12.		1912-13.			
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.		
1	2	3	4	5	6	7	8	9
	lbs	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	
I ...	659	778	848	855	852	959	37 1 4	
II ...	963	1,015	855	962	817	876	35 6 9	
III ...	890	955	903	1,065	490	593	21 7 4	
IV ...	806	893	979	1,300	583	779	25 12 3	

The seed rates of gram used were respectively 40lbs. and 20lbs. The general indication appears to point towards the heavier seed rate being the better. The branching habit of gram prevents intillage and so nullifies any advantage the 18 inches sowings may possess. Germination was somewhat irregular.

SERIES I-F—KHARIF.—Rotation experiment.

Area of each plot ·10 acre.

No. of Plot.	1st year.	2nd year.	3rd year.	4th year.
1	2	3	4	5
I ...	Cotton.	Juar.	Tur.	Cotton.
II ...	Do.	San.	Juar.	Juar fodder.
III ...	Do.	Tur.	Do.	Til.
IV ..	Do.	Pulse.	Cotton.	Juar and pulse fodder.

No. of Plot.	Outturn per acre.									Value of produce per acre.
	1910-11.			1911-12.			1912-13.			
	Crop.	Lint.	Seed.	Crop.	Grain.	Straw.	Crop.	Grain.	Straw.	
1	2	3	4	5	6	7	8	9	10	11
		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.
I ...	Cotton	70	131	Juar	1,165	6,012	Tur	672	1,855	24 14 1
II ..	do.	50	91	San	...	...	Juar	2,315	8,057	222 6 3
III ...	do.	90	174	Tur	1,254	4,100	do.	2,035	6,850	191 7 5
IV ...	do.	110	205	Kulthi	240	434	Cotton	410	807	180 4 5

SERIES G.—SUBJECT.—Dry crop rotations with wheat.

Area of each plot is ·17 acre.

Plot I—Wheat every year.
" II—Wheat and lakh alternately.
" III—Wheat and gram alternately.
" IV—Wheat and gram (mixed) every year.
" V—Wheat with subordinate rows of safflower every year.
" VI—Wheat and sesamum alternately.

Plots not manured in year under report.

No. of Plot.	Name of crop.	Outturn per acre.						
		Average of 5 years 1902-03 to 1906-07.		Average 1907-08 to 1911-12.		1912-13.		
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Value.
1	2	3	4	5	6	7	8	9
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.
I	Wheat ...	794	1,119	701	795	268	315	14 8 10
II	Wheat ...	898	1,564	716	869	679	729	36 9 10
	Lakh ...	553	897	990	1,271	...	...	...
III	Wheat ...	934	1,639	632	774	715	685	38 4 0
	Gram ...	667	582	462	958	...	...	...
IV	Wheat ... } mixed.	676	1,191	524	640	470	444	25 2 0
	Gram ... }	162	344	160	210	368	497	16 4 5
V	Wheat ...	470	933	490	542	435	400	23 3 5
	Safflower ...	296	951	206	528	135	435	8 1 10
VI	Wheat ...	715	899	767	902	606	635	32 9 11
	Sesamun ...	123	307	232	938	...	...	...

SERIES I-D.—To compare Indian and Foreign implements and cultivation.

Area of each plot is ·30 acre.

Rotation—Cotton once and juar twice.
Juar manured in second year.

Plot I—Tillage with introduced implements.
" II—Tillage with country implements.

Crop—Juar in year under report (manured).

No. of Plot.	Outturn per acre.									Value of produce per acre.
	1910-11.			1911-12.			1912-13.			
	Crop.	Lint.	Seed.	Crop.	Lint.	Seed.	Crop.	Lint.	Seed.	
1	2	3	4	5	6	7	8	9	10	11
		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a p.
XIII ...	Cotton	63	118	Juar	525	2,937	Juar	591	1,459	46 6 5
XIV ...	Do.	63	122	do.	517	2,875	do.	647	1,674	52 2 1

The stand was irregular and no remarks can be made.

SERIES N.—SUBJECT.—To test the effect of different cultural treatments preparatory to sowing wheat.

Acre of each plot is ·10 acre.

No. of Plot.	Treatment.	Crop.	Outturn per acre.								Remarks.
			1909-10.		1910-11.		1911-12.		1912-13.		
			Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7	8	9	10	11	12
			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
V	Fallow ...	...	...	...	...	...	...	...	...	...	Grass cut twice.
XVI	Fallow ...	...	...	...	...	...	...	...	...	...	Untouched.
VI	Ploughed in hot weather and bakhared in rains.	Wheat.	671	1,099	802	864	650	880	435	605	
VII	Bakhared in the rains.	do.	800	1,210	795	874	640	632	400	550	
XIV	Not cultivated till after the rains are over.	do.	650	950	360	360	296	320	155	175	Uncultivated till the middle of September.
VIII	San ploughed in early.	do.	690	1,130	915	1,602	660	830	385	425	Ploughed on 14th August.
IX	San ploughed in late.	do.	631	858	666	700	490	576	390	380	Ploughed on 24th August.
X	San ploughed in early with a dressing of 2 maunds of superphosphate at sowing.	do.	713	1,016	995	1,180	767	872	342	387	Ploughed on 14th August.
XI	San ploughed in late and treated with lime at ploughing.	do.	530	1,020	606	662	355	425	360	380	Ploughed on 24th August.
XII	San ploughed in very late.	do.	430	970	624	641	395	435	220	280	Ploughed on 1st September.
XIII	Double cropping.	San.	...	1,240	...	12,670	...	6,670	...	3,820	San cut on 2nd September for fodder.
	1st crop, legume for fodder.	Wheat.	560	1,020	612	647	637	736	585	705	
XV	Double cropping.	Juar.	...	2,070	...	1,330	...	2,460	...	220	Cutting juar on 2nd September for fodder.
	1st crop for fodder sorghum.	Wheat	385	595	481	582	210	312	260	465	
XVII	Double cropping.	Mung.	...	800	...	1,890	164	515	...	615	Mung cut on 17th September as fodder.
	1st crop legume for seed.	Wheat.	432	587	637	695	370	500	345	415	
XVIII	San ploughed in.	do.	..	...	...	...	...	...	290	390	San ploughed on 16th August.
XIX	Do.	do.	...	...	...	...	...	...	215	245	San ploughed on 24th August.
XX	Do.	do.	...	...	...	...	...	...	209	266	San ploughed on 1st September.

This year may be taken as one possessing the worst conditions possible for success with green manuring. The monsoon began three weeks late, which made it impossible to get the *san* to germinate sufficiently early to allow of any growth being made by 20th July, the approximate date of the first inversion in past years.

The *san* did not reach a height equal to that on the 20th of July last year by mid-August. At that time the soil was so wet that ploughing was not done under good conditions.

Finally the rain received after ploughing in was much below that which last year I placed as the limit for success. The latest plots turned in on 1st September (about a week later than is usually the case) were shorter than in past years and only received some 3 inches of rain after inversion and before the sowing of wheat. They reflect this in the returns of 220 and 209 lbs. per acre or half that of the cultivated fallow plots. There was only about 1·25 inches difference in the rainfall receipts after inversion between the lands ploughed on August 14th and on August 24th. The difference between these two plots was not likely to be great. The slight abnormal advantage shown in Plots IX and XI over Plots VIII and X is probably due to the effect on the tilth of the soil condition at ploughing, the soil turned on August 14th being in rather a wetter condition than on the 24th.

The general results of the different plots follow much the lines shown in the past. Under existing average climatic conditions in later August and September green manuring stands little chance of success, if the monsoon rains are delayed or if on that account the germination of *san* is postponed to much after June 20th. The scheme on XIX and XX has been altered from cropping with Kulthi and then wheat to green manuring with *san* once in two years and three years respectively.

THE SEWAGE FARM.

This is a small area of about 4 to 5 acres. The sewage is supplied from a small experimental plant, dealing with the sewage of a number of Government Offices and the Agricultural College Hostel. The flow of sewage pumped up is about 21,000 gallons a day. The experimental plant has been erected in order that an examination may be made of the effects of sewage on the black cotton soil and to study the best types of cropping and soil management on this soil preparatory to the opening of a 600 acres sewage-farm in connection with the sewage of the whole of Nagpur City, and as a guide to the possibility of dealing with City sewage on similar soil in other places. The sewage material can be applied (1) in the crude state from the sewer, (2) after spending some hours in macerating tanks, or (3) after passing through filter beds. The soil is fairly typical of most of the area which will be used for the purpose. It is a good Morand II, a clay loam with a fairly high percentage of small Kankar nodules, possesses a good drainage and has in some portions a somewhat impervious pan about 15 iches to 18 inches below the surface, a not altogether uncommon feature in the black soils.

The sewage supply only began in the end of January. This was not a particularly good date for a start, as it is not a season of the year when it is easy to get most plants to germinate and grow with success. It is a little too late for rabi crops to mature before the heat of March cuts them short, and a little too cold for maize and hot-weather fodders.

The area has been roughly divided into four sections :—

(1) The largest, will be under ridge and furrow cultivations of different kinds, soil inversion and aeration will be frequent, and the crops for the most part will be of quick-growing plants.

(2) A smaller area laid out in small beds under flood irrigation and growing seeding crops.

(3) An area, partly under furrow and ridge and partly (to a smaller extent) under flat beds and growing crops of perennial or partly perennial character as lucernes, guinea-grass and ordinary grass and plantains, etc.

(4) An area which differs from the remainder in being under drained, half under a pipe system constructed with country-made tile pipes, half under a cheaper boulder filled drainage. The cultivation on this will be partly in various forms of ridge and furrow and partly flat. The cropping will be chiefly annuals though a small area will be covered by perennial plants.

The following plants have been sown and are doing well:—Guinea grass, lucerne, ringni juar, cane, maize and hot weather juars. During the passed 3 or 4 months irrigation has been given freely to all sections growing crops as required. This coming year variation will be made on the sections both in the quantity and nature of the sewage applied. At present there is a difficulty in finding either efficient management or sufficient labour to distribute the water and to work the land really well. These are essential. In order to make the scheme a really effective experimental trial for the future, the quality of the sewage needs strengthening. In my opinion the material is too dilute. I strongly recommend the inclusion of some pail depôts in the line. Unless the sewage is up at least to the full strength of what it will be in the city, neither the disposal plant or the soil treatment can be said to be getting a fair experimental trial. Mr. Hutchinson, Imperial Bacteriologist, has kindly taken an interest in the working of the experiment. He visited the farm in February and in conjunction with the Agricultural Chemist and myself discussed the future work on this area, from the cropping, chemical and bacteriological experimental stand points. At his suggestion 2 or 3 fresh water irrigated check-plots are being arranged for. I consider that from all points of view this experiment should prove of extreme interest and definite value.

THE STUDENTS' AREAS.

The general cropping and work was much the same as in the last year.

The second year students cultivated cotton, tur, linseed, wheat and gram. As a whole the kharif crops were good and attention given was careful. In some cases the rabi crops were poor in germination. The kharif section of the field is improving in fertility.

The third year students supervised their experimental plots and carried on garden cultivation as in last year. On the whole I think the former was poorer and the latter better than last year.

The demonstrational variety plots were better managed this year than hitherto, but leave room for future improvement.

The following is a synopsis of the field experiments controlled by the 3rd year students and the garden crops cultivated by the same.

Kharif.

To compare under ordinary good cultivation the outturns of different juars and cottons.

To compare paddy transplanted in bunches with the same planted singly.

To compare outturn of selected and unselected juar.

To compare the effect of different spacings on Jari and Buri cottons and juar.

To compare line-sowing and broadcasting in juar and cotton.

To compare the effects of farm-yard manure in different amounts and assisted or not with calcium nitrate with unmanured cotton.

Rabi.

To compare the effects of various cultivation, seedrates and spacings on wheat.

To compare the effects of the application of manure at different periods in the monsoon on the wheat crops.

To test the effect of different dates of green manuring before wheat.

To compare the effects of manure and tillage on wheat.

To compare the effects of nitrogenous and phosphatic manures on wheat.

To compare the effect of catch-cropping with a leguminous plants and fallowing before wheat.

To compare cropping capacity of different wheats under local conditions and to test selected and unselected linseeds.

The following garden crops were grown by this year:—

Chillie, cucurbits, brinjal, ginger, turmeric, groundnut, potato, onions, menthi and other spices, cabbage, and other vegetables. Konlkhol and other roots. Yam and sweet potato.

THE FARM CROPS.

Cotton.

The larger part of the area under cotton was sown with Rosea cotton. Considering that the season was not entirely suited to high cotton returns, the yield from cottons was good. This coming year the whole area will be under a farm selected Rosea, and a certain area cultivated by tenants round the farm will be treated as a seed farm in connection with the College Farm. Mr. Graham, Economic Botanist, will, in future, devote some of his attention to the improvement of Central Provinces cotton and the College Farm will be used to propagate these improved types.

Juar.

The general growth of the crop on the farm was fair, the chief varieties grown were Saoner, Chapti, and Ramkel. The latter was not good, the seed germination was distinctly below standard.

Trial of juars was continued both as regards grain and fodder.

In the former the test plots were of 1-25th acre and each consisted of 5 lines spaced 3 feet apart and having plants from 5 to 6 inches apart in the rows.

This method of sowing shows some signs of giving a better outturn than the usual 18 inches line sowings commonly adopted. The total area under plots, which were situated in one block, was $\frac{24}{25}$ acre and was unmanured land but of good quality. The total return of the twenty-four varieties amounted to 1,955 lbs. or 2,036 lbs. per acre. Each of the five lines of each plot was derived from the seed of a single selected head.

The returns per variety and per line in each variety showed considerable differences.

The following is a list of types grown and the yields per plot with the percentage return.

Type.	Yield on 1/25 acre.	Average.	
		Per cent return of each line.	Per cent variation limits in different lines.
1	2	3	4
	lbs.	lbs.	lbs.
Natora ...	83·2	11·1	12·2—9·4
Alipuri ...	79·7	8·7	10·5—6·5
Jagdhan ...	55·9	8·6	10·7—6·6
Safeda ...	110·	11·7	12·7—9·5
Detha A ...	103·	12·	15·1—10·3
Detha C ...	97·	9·3	13·1—7·2
Amner A ...	96·9	10·4	11·5—9·
Chapti A ...	120·	15·7	20·8—10·7
Chapti E ...	103·	13·5	14·9—11·5
Chapti D ...	81·	12·2	13·5—12·3
Saoner ...	94	9·7	10·3 -8·1
I-A-24 ...	103	11·5	17—8·5
Dor F ...	75	9·6	11·4 - 8·1
Dhamna A ...	61	6·6	7·1—5·4
Ramkel ...	74	7·	8·5—5·1
Lamkhansi ...	66	7·9	9·3—7
Macca ...	85	7·9	10·- 6·5
Lahi Ec. B ...	116	12·8	15·5—8·4
Macca S. P. ...	66·7		
Halki ...	48		
II-57 ...	72	Not in separate type lines.	
III-1 ...	77		
I-35 ...	61		
I-50 ...	59		

Every type giving a return of over 97 lbs. may be considered as safely above the average and those below 70 lbs. as of little practical value.

A large experimental error of 20 per cent has been taken. Those between 70 lbs. and 97 lbs. may be considered as lying within the margin of error.

The following returns were got per acre in the fodder juars tested, each being cut as it reached the same stage of ripeness.

Name of variety.	Date on which cut.	Weight of green fodder per acre.	Weight of hay per acre.
1	2	3	4
		lbs.	lbs.
1. Sundia ...	4th October 1912 ...	4,700	1,950
2. Hundi ...	17th " " ...	9,650	4,425
3. Itavli ...	22nd " " ...	6,800	2,850
4. Nilva ...	29th " " ...	9,675	4,750
5. Collier ...	5th November 1912 ...	8,750	4,750
6. Amber ...	15th " " ...	7,850	5,025
7. Chapti ...	17th " " ...	11,350	7,125
8. Lamkansi ...	17th " " ...	12,500	7,500

Bbajra. — A small area was under this crop.

Tur. — The crop was not particularly successful, a very large area of the field in which sown was affected by excess water.

Soy bean. — This crop was again under close observation. A number of types were under examination.

The success with which wheat on the farm can follow a catch crop of leguminous character in a normal year, provided it can be cut early enough, led me to believe that there was a possible future for the early seeding soy bean varieties, some of which can be harvested in two months from the date of sowing. Under such circumstances a good oil-yielding variety, though only giving 300 lbs. of seed, would be a possible profitable catch-crop in that in a normal year its growth before wheat reduces but little the succeeding wheat yield. There is no doubt that the crop should be sown early in the season, preferably by the middle of June. The only year, the first year when tried, in which reasonable returns were got was when this was the case. This year the later monsoon prevented sowing before the 10th of July. The very heavy rain in the next month affected the growth on black soil. I cannot say that these early varieties of soy bean show much indication of being suitable at any rate on the black cotton soil. Turning to the later types, these ripen in 4 to 5 months from sowing. Most of these grown this year were kindly sent for trial by the Economic Botanist, Behar. The American varieties imported two years ago failed to give any satisfaction under the climatic conditions in which grown. One black seed variety from Java

possessing a type of growth similar to the soy bean which has been grown to some small extent in the past on Government farms in the Central Provinces, gives fair indication of being a satisfactory grower under local conditions. One or two of the Bengal varieties give some promise of success. As these are whole season crops a yield of 700 to 800 lbs. is practically necessary.

The oil percentage varies between wide limits from as low as 13·09 per cent to as high as 21·15 per cent; both extremes were derived from Bengal. The oil return of the most prolific, *i. e.*, Tava, is only 14·21 per cent. This is about $1\frac{1}{2}$ per cent higher than the local soy bean. E. 357 and S. B. 4355 are those which, inclusive of oil percentage, appear the most promising. The other three marked as indicating good yielders of seed are low oil percentage types. Two types, S. B. 4359 and E. 356, contain over 7 per cent nitrogen in the seed.

Early Varieties.

Type.	Nature of growth.	Inclination of leaf stalks to axis.	Position of pods.	Colour of hair on pod.	Seed shape.	Seed colour.	Oil percentage.
1	2	3	4	5	6	7	8
No. 3 ...	Erect with short internods.	Acute angle ...	At axil of leaves on main stem in groups.	White ...	Flat ...	Yellow ...	18·8
No. 5* ...	Do. ...	Do. ...	Do. ...	Do. ...	Rounded .	Do. ...	13·97
No. 6 ...	Do. ...	Do. ...	Do. ...	Do. ...	Slightly flattened, large.	Do. ...	16·6
No. 7 ...	Do. ...	Very acute angle.	Do. ...	Do. ...	Large rounded.	Do. ...	15·29
No. 9† ...	Do. ...	At right angles.	Do. ...	Tawny brown.	Medium size slightly flattened	Straw colour.	15·43
No. 10 ...	Do. ...	Acute angle ...	Do. ...	White ...	Large and much flattened.	Yellow ...	18·14
No. 12 ...	Do. ...	At right angles.	Do. ...	Tawny brown.	Slightly flattened.	Do. ..	15·6
No. 15 ...	Do. ...	Nearly at right angles.	At axil of leaves on main stem but scattered.	White ...	Long flattened.	Do. ...	17·73
No. 18† ...	Do. ...	At acute angle.	At axil on leaves on main stem in groups.	Do. ...	Round ...	Yellow white.	16·74
Harbin ...	Do. ...	Do. ...	Do. ...	Tawny brown.	Long slightly flattened.	Yellow ...	18·07
Dalny ...	Do. ...	Do. ...	Do. ..	Do. ...	Do. ...	Do. ..	17·58

Those marked * have some indication of yielding satisfactorily.
Those marked † are very early.

MEDIUM VARIETIES.

Type.	Nature of growth.	Inclination of leaf stalks to axis.	Position of pods.	Colour of hair on pod.	Seed shape.	Seed colour.	Oil percentage.
1	2	3	4	5	6	7	8
No. 8 ...	Erect with short internods.	Very acute angle.	At axil of leaves of main stem in groups.	White ...	Long and slightly flattened.	Yellow ...	18·34
No. 17 ...	Erect with long internods.	At acute angle.	Do. ...	Tawny brown.	Do. ...	Do. ...	19·08
No. 19 ...	Do. ...	Do. ...	Do. ...	White ...	Large rounded.	Greenish.	18·69
No. 20 ...	Do. ...	Do. ...	Do. ...	Do. ...	Long and large.	Yellow ...	17·41
Mammoth ...	Do. ..	Do. ...	Do. ...	Do. ...	Large slightly flattened.	Do. ...	18·29
Black American.	Do. ..	Do. ...	Do. ...	Do. ...	Long much flattened, small.	Black ...	15·73
Queensland Black early.	Erect with large internods.	Do. ...	Do. ...	Do. ...	Do. ..	Do. ...	16·03
Queensland large yellow.	Do. ...	Do. ...	Do. ...	Do. ...	Large slightly flattened.	Yellow ...	18·58
Queensland small yellow.	Do. ...	Do. ...	Do. ...	Do. ...	Medium and slightly flattened.	Do. ...	19·73
Bengal* S.B. 4355.	Do. ...	Do. ...	Do but more pods in each group.	Do. ...	Do. ...	Chocolate.	21·15

LATE VARIETIES.

Name.	Nature of growth.	Appearance of seed.	Colour of seed.	Oil percentages.
1	2	3	4	5
Java * ...	Branching with pods scattered in branches.	Small flattened ...	Black ...	14·21
Bengal S. B. 4356...	Do. do.	Do. ...	Yellow ...	16·44
S. B. 4357 ...	Do. do.	Do. ...	Chocolate ...	16·67
S. B. 4358 ...	Do. do.	Do. ...	Black ..	14·30
S. B. 4359 ...	Branching vinelike growth ...	Do. ...	Green ...	16·16
E. 355 ...	Do. do.	Do. ...	Yellow ...	16·43
E. 356 * ...	Branching with pods scattered in branches.	Do. ...	Black ..	13·09
E. 357 * ...	Do. do.	Do. ...	Chocolate ...	16·59

Those marked * have some indication of yielding satisfactorily.

Wheat.—Haura wheat was the chief wheat grown. An early ripening variety, Tigharia wheat, sent by Mr. Evans for trial did satisfactorily in a season when wheat was not at its best on the farm.

Linseeds.—The linseed grown on the farm was chiefly in the nature of plots of selected strains. The outturn was remarkably good, except in one or two plots which suffered from wilt, and in one or two in which sowing was too thin. The average outturn per acre from plots of red linseed unaffected by the above defects

was 862 lbs. and varied between 1,203 lbs. and 550. Assuming an error of 20 per cent, all plots, giving a return over 1,035 lbs., may be considered as over the average in productive capacity and those with yields of less than 690 lbs. as definitely poorer types.

There were five types which may be classed in the first group and four types in the second, leaving some eighteen as doubtful.

In white linseed the average was 726 lbs. per acre, and assuming the same percentage of experimental error, those over 870 lbs. are good and those below 580 poor. There were two in each group and five were indefinite.

Line sowings were also made.

Gram.—An excellent crop was harvested this year.

Oats.—Only a limited area was sown as fodder; being late sown it was not as successful as last year.

Ringni juar.—This was sown on the Sewage Farm area and gave a satisfactory return of green fodder.

Clover.—This crop did very satisfactorily, some 30,000 lbs. were harvested off about one acre of land.

Chillies.—As last year this was only grown on a small scale by the Assistant Botanist. The separation of a small round chillie, which can be grown on the black soils without irrigation of any kind, should prove of considerable value to the small cultivator.

IMPLEMENTS.

The only new implements introduced on the farm, were—

(*a*) a turnwrest plough built on Indian lines, which is convertible into a double mould board plough or a cultivator, made by Ransome & Co. It works fairly satisfactorily, though as a double mould board plough it is somewhat difficult to balance.

(*b*) a Cotton King Disc Harrow. This last arrived a little too late in the season, when the surface soil had become too hard to allow of its getting a fair trial as a soil mulcher, preparatory to later ploughing. It has worked satisfactorily on the sewage area after the plough.

Statement showing the distribution of seed from the Nagpur Experimental Farm for the year 1912-13.

Name of seed.	Quantity supplied.		
	District and other Government officers.	Private persons.	Demonstrating and experimental farms.
1	2	3	4
	Lbs.	Lbs.	Lbs.
Cotton	...	34	...
Maize	...	2	...
Juar	5,168	720	20
Tur	...	720	...
Paddy	...	20	...
Gram	40	347	200
Linseed	...	1,044	600
Peas	...	45	...
Wheat	...	374	...
Til	...	20	...
Lakh	...	81	...
Safflower	...	20	...
Total ...	5,208	3,427	820

Statement showing the receipts and expenditure of the College Farm, Nagpur, for the year 1912-13.

Total heads.	Amount.
1	2
	Rs. a. p.
Sale of produce	2,674 4 7
Distribution { Seeds	424 3 6
Distribution { Implements	2 13 0
Rent of Government land { Dry cultivation	381 12 0
Rent of Government land { Wet cultivation	636 8 0
Dairy	2,540 1 5
Miscellaneous	36 10 0
Inter-Departmental transfers	11 2 9
Total Receipts ...	6,767 7 3
Charges.	
Salary of Superintendent	1,800 0 0
Do. Overseers	1,948 8 10
Do. Clerks	522 8 0
Do. Jamadar and peon	240 0 0
Conveyance allowance	30 0 0
Travelling do.	64 4 0
Charges for seed grain	260 4 0
Farm buildings	1,899 14 3
Construction and repair of road, etc.	197 1 0
Purchase of cattle and implements	2,000 11 3
Feed and care of cattle	3,000 14 9
Servants paid from contingencies	5,928 9 0
Manure	369 1 3
Service postage and telegrams	42 10 0
Stationery purchased locally	1 5 3
Dairy charges	1,664 5 5
Miscellaneous	2,874 4 10
Total ...	22,844 6 8

Statement showing outturns of areas under different crops.

Non-experimental area and outturn.			Experimental area and outturn.		
Crop.	Area.	Outturn.	Crop.	Area.	Outturn.
1	2	3	4	5	6
	Acres.	Lbs.		Acres.	Lbs. Oz.
San ...	6·27	764	Soybean ...	·10	21—4
Tur ...	21	2,122·12	Mung ...	·10	3—10
Soy ...	3	236·9	Wheat ...	2·29	1,368—12
Tilli ...	9·22	2,076	Mung by wheat ...	·20	62—4
Castor ...	1	117	Soy by wheat ...	·10	76
Juar ...	20·54	14,135·2	Dhaniby by wheat ...	·5	47—8
Cotton ...	16·73	7,005	San by wheat ...	·9	300
Wheat ...	24·23	11,023	Juar by wheat ...	·1	26
Kulthi ...	·20	12	Gram ...	3·52	2,203
Bajra ...	·20	10	Tur ...	·101	67—4
Paddy ...	·32	190	Cotton ...	1·3	826—4
Maize ...	·25	103	Juar ...	1·2	1,273
Gram ...	37·93	20,540	Wheat and gram mixed ...	·17	80—62—8gr.
Peas ...	1	277	Wheat and Kardi ...	·17	74—23—0
Peas ...	1·23	Sold green.			
Khaparkheda Peas ...	·25	60			
Lakh ...	1·5	660			
Oats ...	·5	238			
Masur ...	·5	151			
Fodder Juars ...	3·35	2,095			
Linseed ...	10·36	...			

The College Dairy Farm.

This is the first year in which this farm can be said to have become a reality. Hitherto the only form of milk-stock on the farm has been cows kept for the convenience of owners on leave, and used for teaching purposes when so required. In February 1912 three Delhi buffaloes and two Hansi Hissar cows were bought.

As a working dairy the first commencement was made in April 1912. Hitherto any sales made have taken the form of whole milk. The dairy work has since then been principally directed towards milk products rather than whole milk. The latter has only been supplied to a few customers, principally to children and invalids' cases in which a specially sanitary and hygienic supply was essential, and in cases when pasteurized or sterilized milk was desirable. Butter has been the chief milk product sold, though cream, skim milk and ghi have also found a ready sale. Cream cheeses have also been manufactured in experimental quantities. A certain amount of material has been used in experimental purposes; and it is hoped that time will permit of further experimental work in the near future.

The buildings, both the animal shed and dairy, are well built structures capable of being kept in a thoroughly clean condition, and the surroundings where milking is done are as hygienic as possible. The dairy is well equipped and only lacks a modern steam sterilizing outfit to make it perfect. This, however, is on its way from England and should be established within the next month.

In the months of August to December it was necessary this year to supplement the milk supply on the farm by keeping a few additional buffaloes belonging to Gowlis. These were treated and fed like the farm milk-stock. This will probably not be necessary in the future, as purchases in November of stock, both buffaloes and cows, have increased the milk capacity of the farm, and further anticipated purchases in July 1913 should allow of enough animals to get over the season without a severe falling-off of the milk returns of the herd at any one time, as was experienced when the numbers were only half a dozen head.

By careful soiling it has been possible to keep the herd regularly supplied with 20—25 lbs. of green food per head, except in May when resort had to be made to the silo pits for succulent fodder.

The herd consists of 9 milking buffaloes (3 Delhi, 5 Surti and 1 local) 7 cows (2 Hissar and 5 local), 3 yearling buffaloes, 7 buffalo calves, 2 two-year old Gaola's bulls, 1 yearling Hissar, heifer and 6 calves. Of the non-milking young stock of buffaloes, 8 are females and 2 males, and of the non-milking cattle, 5 are males and 4 females. The buffaloes of the herd are on the average very fair producers. The cows on the whole are a poor lot, in particular two derived from a lot purchased for Telinkheri, which were nothing like the value paid for them.

The cost of feeding the above herd inclusive of fodder and inclusive of the extra animals retained in the dairy herd from August to December, and not included in the above list, amounted to Rs. 2,042.

The following feeding schedule was approximately maintained :—

Yield.	Buffaloes.	Cows.
10—12 Seers ...	4 lbs. Til cake ...	3 lbs. Cake.
	4 lbs. Chunni ...	3 lbs. Chunni.
	2 lbs. Cotton seed ...	2 lbs. Cotton seed.
	2 lbs. Grain meal ...	1 lb. Grain meal.
8—10 Seers ...	10 lbs. of above ...	$\frac{5}{6}$ of above.
6—8 „ ...	7—8 lbs. of above ...	$\frac{2}{3}$ of above.
5—6 „ ...	6 lbs. „ ...	$\frac{1}{2}$ „
4—5 „ ...	5 lbs. „ ...	$\frac{1}{2}$ „
3—4 „ ...	4 lbs. „ ...	$\frac{1}{3}$ „
2—3 „ ...	3 lbs. „ ...	$\frac{1}{3}$ „
	Salt 1 oz.	

Fodder for all buffaloes.	Cows.
25 lbs. Green fodder	... 15 lbs. Green fodder.
10—12 lbs. Dry fodder	... 8 lbs. Dry fodder.
Concentrated food given.	**Fodder given.**
$\frac{1}{2}$ Morning	... $\frac{2}{5}$ About midday or after return from morning exercise.
$\frac{1}{2}$ In the evening	... $\frac{3}{5}$ At night.

When grazing was of value, the exercise period was longer and the amounts of fodder reduced in proportion to the value of the grazing.

Appendix A.—Gives the monthly details of the milk dealt with from April 1st, 1912, to March 30th, 1913.

Briefly.—38,254 lbs. of milk were dealt with in the Dairy. Of this—

5,947 lbs. were sold realizing Rs. 496;
1,972 lbs. was fed to young stock;
30,016 lbs. were separated for other uses.

From this approximately 24,840 lbs. of skim milk was got, of which 12,983 lbs. were sold, realizing Rs. 433, and 5,398 lbs. were fed to calves.

The balance cannot be regarded as entire loss, though it will be reduced in future with the better establishment of the dairy. A certain amount is intentionally given to the dairy hands to reduce any temptation to pilfer more valuable material, and a certain amount is daily used up in the dairy in making starters.

Of the milk separated, approximately 302 lbs. was sold off as cream, realizing Rs. 221, and 2,291½ lbs. of butter manufactured, of which 1,866 lbs. was sold for Rs. 1,633, and 422½ lbs. was converted into ghi=334 lbs. of the value of Rs. 293.

The relation of milk separated to butter and cream, the latter being calculated at its butter value, was over the year 12 lbs. of whole milk to 1 lb. of butter.

The ratio of butter used to ghi produced therefrom was as 100: 79·4. The ratio is higher in the colder months and lowest in the hot weather, due to the higher percentage of water removable in the making of the butter in the former period without loss of texture.

The water percentage in the butter varied from about 13 per cent to 18 per cent according to climatic conditions.

Appendices B and C give the returns, in milk of the individual animals belonging to the dairy during the year under report. It will be readily seen from these that the cows in C are on the whole of extremely poor quality and scarcely worth keeping.

The buffaloes however are a better lot; but it will be noticed that they vary considerably in value both as milk and as butter fat producers. Ledi for instance is a high whole milk producer. If we take a pound of butter fat at Re. 1, her value as a whole milk animal in a dairy is greater than her value as a butter fat producing machine. Genda on the other hand is proportionately more valuable in a butter dairy than in a whole milk one.

The local buffalo is a second grade animal, having a production a little above the local average but not as good as it is possible to get.

These differences in productive capacity and the nature of the product give ample scope for improvement by breeding and selection along definite lines.

The College farm has yet to get its bulls, a matter of considerable importance in deciding its future success.

Appendix D gives the value of the produce of the dairy throughout the year and cost of working the same.

It should be noted that for about 5 months of the year the returns from the dairy were very low as the herd was too small for the outfit, the charges for labour, depreciation, and to some extent working materials, but that the later returns, when the herd was strengthened, tended to make good this loss. I see no reason why the herd should not pay its way successfully in future years when it has been strengthened by the addition of a few more head. Under local conditions and prices a dairy run *imprimis* as a whole milk supply would pay easily as the running charges would be less. The productions of first class milk, butter and ghi under local climatic conditions are more difficult and costly processes than the average consumer is willing to pay for, though undoubtedly a market exists for pure products, including pure ghi, at a price higher than the best bazaar rates, both among the European and Indian communities.

The dairy herd were of great educational value in the College and the dairy farm received visits from a large number of people throughout the year and created a considerable amount of interest. The demand for produce was greater than the supply.

Calf feeding experiments are considered with the other feeding experiments detailed in the report.

Factors relating to quality and flavours in ghi and the possibility of producing a cheaper ghi substitute of saleable character and the relationship of foods to quality and hardness of butter in the hot weather are under consideration.

Appendix A.

Monthly total.

Month.	Milk.				Cream sold.	Skim milk.			Butter.			Ghi.		Ratio of milk separated to butter.	Ratio of ghi to butter.
	Total milk treated.	Sold.	Fed.	Separated for cream and butter sale.		Skim milk.	Sold.	Fed.	Butter made.	Sold	Converted to ghi.	Ghi got.	Ghi sold.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		lbs.	lbs.	lbs.			
April 1912 ...	1,816	494	95	994	·2	794	152	...	65·7	28	20·14	16·5	...	14·4	77·6
May ,, ...	1,715	226½	...	1,488	·8	1,190	154	...	102·8	69·8	41·12	33·5	...	14·5	80·2
June ,, ...	1,356	215	...	1,141	...	910	423	...	86·12	57·4	22·15	18·1	...	13·1	81·8
July ,, ...	1,108	182	...	926	...	736	504	...	63·2	66·2	16·12	1·6	...	14·4	80·
August ,, ...	1,040	182	...	857	...	680	386	...	63·14	64·8	...	...	...	13·2	...
September ,, ...	1,814	153	...	1,660	...	1,176	878	282	108·4	93·4	15	12·1	...	15·3	80·6
October ,, ...	3,495	276	184	3,055	5·9	2,486	1,308	384	201·9	126·12	57·6	45·2	...	14·8	78·7
November ,, ...	4,251	474	396	3,380	37	2,604	1,420	622	242·7	209·8	26·1	20·9	...	12·5	79·1
December ,, ...	6,844	744	616	5,484	92·14	4,708	2,127	744	378·8	320·8	61·14	51·8	...	12·2	83·4
January 1913 ...	5,458	1,007	490	3,962	62	3,304	1,933	1,344	336	278·8	90	70·3	...	10·4	78·8
February ,, ...	4,672	926	196	3,550	53·12	3,004	1,824	1,008	322	261	59·8	46·8	...	9·8	78·1
March ,, ...	4,885	1,068	...	3,817	48·4	3,248	1,874	1,014	321	297·10	25·6	18·10	...	10·2	75
Total ...	38,254	5,947	1,972	30,014	301·15	24,840	12,983	5,398	2,291·7	1,866·2	422·8	333·15	...	12·9	79·4
Value ...	Rs. 3,186 @ 12 lbs. a Re.	Rs. 496 @ 12 lbs. a Re.	...	...	Rs. 221 @ 12 As. a lbs.	...	Rs. 433 @ 30 lbs. a Re.	...	Rs. 2,004 @ 14 As. a lb.	Rs. 1,633	...	Rs. 293.	...	...	...

Appendix B.

Buffalo.		Lbs. of milk from April 1st 1912 to March 31st, 1913.	No. of days in milk in year under report.	Average over the year.	Average per day in milk.	Average fat per cent.	Lbs. of fat in milk.	Value of milk in year at six seers. per Re. 1.	Total milk since introduced into herd.	Date of introduction.
1		2	3	4	5	6	7	8	9	10
				Lbs.	Lbs.			Rs.		
Delhi	Genda	3,659	350	10·02	10·4	9·2	326	304 6 0	3,921	1st March 1912.
	Ledi	4,845	323	13·3	15·0	7·7	374	403 7 0	5,091	do.
	Maini	2,865	292	7·8	9·8	9·2	263	238 7 0	3,136	do.
Surti	Chandy	2,238	137	...	16·3	8	179	186 5 0	2,238	14th Nov. 1912
	Gaora	2,547	125	...	20·3	8·4	214	212 2 0	2,547	do.
	Bhury	2,210	137	...	16·1	8·5	188	184 0 0	2,210	do.
	Chandri	1,683	130	...	12·9	8·2	138	115 0 0	1,683	do.
	Dundy	2,191	137	...	16	7·6	166	182 0 0	2,191	do.
Local	Radha	1,337	117	...	11·4	8·2	109	111 4 0	1,337	3rd Dec. 1912.
	Total	23,575	...	...	...	...	1,957	1,938 1 0	24,354 lbs.	

Appendix C.

Name.	Date of introduction.	Date of milking.	Weight of milk in year April 1912 to March 1913.	Lbs. per day in year.	No. of days in milk.	Lbs. per day in milk.	Value of milk at 6 seers a rupee.	No. of days in milk since purchase.	Lbs. of milk since purchase.
1	2	3	4	5	6	7	8	9	10
							Rs.		lbs.
Harni (Hissar)	25th February 1912.	25th February 1912.	2,596	7·4	365	7·4	216	400	2,808
Lanka do. ...	Do. ...	Do. ...	1,116	3·06	194	5·7	93	229	1,276
Tulja ...	30th November 1912.	30th November 1912.	936	2·5	121	7·7	78	121	936
Kashi ...	Do. ...	13th January 1913.	441	1·2	66	6·7	37	66	441
Jani ...	2nd December 1912.	2nd December 1912.	551	1·5	119	4·6	46	119	551
Kisni ...	Do. ...	Do. ...	520	1·4	119	4·3	43	119	520
Total ...			6,160 Fat per cent 4 lbs. of fat 246 lbs.	...	984	6·2	513	...	6,332 lbs.

Appendix D.

			Rs.
	Cost.		
For Food from April to September and from October to March	...	...	2,026
For Labour	...	...	600
For Miscellaneous minor charges—			
Ice, Salt, Soda, cleaning material, etc. and running expenses,	...	...	528
Depreciation and interest—			
On buildings at 5 per cent	...	...	300
On Dairy outfit at 15 per cent	...	...	105
On purchased stock at 15 per cent	...	...	270
		Total ...	3,845
	Returns.		
Value sold	...	...	3,076
Value used in Dairy and charged above	...	...	336
Value used in experiments and testing	...	...	95
		Total ...	3,507
Skim milk value unused	...	...	215
		Total ..	3,722

Appendix E.

Statement showing the paid receipts in cash received on account of milk, cream, butter etc., of the College Farm Dairy for the year 1912-13 *from month to month.*

Month.	Amount.	Remarks.
1	2	3
1912.	Rs. a. p.	
April	55 9 3	
May	64 0 3	
June	52 2 6	
July	134 11 3	
August	51 9 6	
September	137 9 9	
October	129 0 0	
November	55 10 11	
December	222 5 6	
1913.		
January	651 14 3	
February	365 0 0	
March	650 8 3	
Total ...	2,540 1 5	

FEEDING EXPERIMENTS.

(1). TO COMPARE A DIET IN WHICH PROTEID PREDOMINATES WITH ONE CONTAINING GRAIN.

Buffalo femaie calves.—Six calves were included in this experiment. These were divided into two groups of 3 each. In each there were two calves of $3\frac{1}{2}$ to 4 months of age and one of $2\frac{1}{2}$ months when the experiment began.

The comparison in feeding was made in the first place between a substitute with skim milk rich in proteid and oil, and one in which carbohydrate was the chief ingredient. Later, when the skim milk was given up, the first group had a diet of proteid character while in the other juar grain was included to the exclusion of a similar weight of chuni or cake.

The feeding tests lasted 4 months.

1st 45 days—

Group A.	Group B.
5 lbs. separated milk.	5 lbs. separated milk.
¾ lb. linseed gruel.	1 lb. juar meal. } fed dry after milk.
½ lb. bran.	½ lb. bran }
½ lb. chunni.	

Towards the end of this period the skim milk was gradually reduced and replaced gradually by til cake in both cases. The linseed gruel in the first group was reduced with the milk and the juar grain meal was treated in similar fashion, till in the 2nd 45 days the rations were—

2nd 45 days—

Group A.	Group B.
½ lb. Chunni.	½ lb. Juar meal.
½ lb. Bran.	½ lb. Bran.
½ lb. Cake.	½ lb. Cake.
1½ lbs.	1½ lbs.

3rd 30 days.

Group A.	Group B,
¾ lb. Chunni.	1 lb. Juar meal.
¾ lb. Bran.	½ lb. Bran.
¾ lb. Cake.	½ lb. Cake.
2 lbs.	2 lbs.

All animals maintained a good condition throughout the period and the development of the parts of the body appears similar. Group B are perhaps slightly softer on handling.

Weight at beginning.	End of 30 days.	End of 60 days.	End of 90 days.	End of 120 days.	Total gain.
1	2	3	4	5	6
Group A.	lbs.	lbs.	lbs.	lbs.	lbs.
1. 164 lbs.	190	209	243	259	95
2. 190 lbs.	212	229	260	302	112
3. 143 lbs.	151	174	200	214	71
Average 166 ...	184	204	234	253·6	2,780 lbs.
Gain .. Progressive ...	18	38	68	92·6	92·6 lbs.
Gain .. During each period ...	18	20	30	24·6	
Group B.					
1. 160 lbs.	197	216	249	266	106
2. 200 lbs.	228	260	286	324	123
3. 210 lbs.	238	273	308	337	127
Average 190 ...	221	249·6	281	309	356 lbs.
Gain progressive ...	31	59·6	91	119	119 lb.
Gain over preceding weight ..	31	27·6	31·4	28	

Foods consumed other than fodder which was allowed as animals chose to take it.

	Group A.	Group B.
	Skim milk 195 lbs.	Skim milk 195 lbs.
	Linseed 25 lbs.	Juar meal 93 lbs.
	Chunni 95 lbs.	Bran 60 lbs.
	Bran 60 lbs.	Cake 48 lbs
	Cake 48 lbs.	
	Rs. a. p.	Rs. a. p.
Value of skim milk (if sold off farm.)	... 6 8 0	... 6 8 0
Value of concentrates	... 7 2 0	... 6 2 0
Total	... 13 10 0	... 12 10 0

Price per lb. of increase weight.
2'37 annas. 1'7 annas.

Gain in live weight = 26 lbs. per head
Cost of gain per lb. '67 annas less.

The gain is greater than any experimental error introduced by the number of animals included in the experiment.

SECOND WORKING STOCK.

Experiment I.

To estimate the efficiency of cotton seed as sole concentrated food for hard worked stock, and to compare this with diets contain cake, grain meal.

Four pairs of bullocks were selected.

The four following diets were compared.

(1) Fodder, juar, karbi as required + 2 lbs. cotton seed and 2 lbs. gram bhusa.
(2) Do. do. + 4 lbs. cotton seed.
(3) Do. do. + 2 lbs. cotton seed and 2 lbs. chunni and 1 lb. til cake.
(4) Do. do. + 2 lbs. cotton seed, 2 lbs. juar meal and 1 lb. soy bean.

All the pairs employed were given as equal work as possible, being employed chiefly in ploughing, and, if not so, in bakhar work. Work was done for 9 hours a day on 6 days in the week, and on the 7th for 4 hours. Weighing was done regularly every day and the weights recorded are the averages of each week.

In order to make things more uniform each animal in a pair received a different diet.

Pair	1 ...	A	received	diet 1.
		B	do.	do. 2.
Do.	2 ...	C	do.	do. 3.
		D	do.	do. 4.
Do.	3 ...	E	do.	do. 1.
		F	do.	do. 2.
Do.	4 ...	G	do.	do. 3.
		H	do.	do. 4.

	Weight in 1st week.	Weight in 3rd week.	Weight in 5th week.	Weight in 7th week.	Loss or gain in seers.
1	2	3	4	5	6
	Md. srs.	Md. srs.	Md. srs.	Md. srs.	Seers.
Diet 1 ... A ...	11 12	11 3	10 30	10 21	
Diet 1 ... E ...	11 34	11 22	11 10	11 2	
Avera ...	11 22	11 12½	11 0	10 32	—30
Diet 2 ... B ...	12 19	12 8	12 0	11 30	
Diet 2 ... F ...	12 14	12 1	11 37	11 32	
Average ...	12 16½	12 4½	11 38½	11 31	—25½
Diet 3 ... C ...	12 18	12 14	12 13	12 5	
Diet 3 ... G ...	12 3	12 0	11 38	11 32	
Average ...	12 10½	12 7	12 5½	11 38½	—12
Diet 4 ... D ...	13 24	13 28	13 23	13 20	
Diet 4 ... H ...	12 21	12 17	12 18	12 16	
Average ...	13 2½	13 2½	13 0½	13 [illegible]	— 4½

The experiment was made with a view to determining how far the standard farm rate of 4 lbs. of cotton seed per head met the requirements of a steady hard work in the hot weather and with a view to comparing the concentrated diet chiefly composed of foods in which proteid is the most important feature with one in which meal was included.

The number of animals included may not have been many but the almost steady uniformity of the results show that cotton seed and cotton seed and leguminous bhusa were totally inadequate and that a diet containing some grain is desirable when hard work is contemplated.

Experiment II.

To compare a diet of cotton seed and til cake with one consisting of cotton cake and grain meal.

Diet of 1st group ... =3 lbs. Cotton seed and
2 „ Mill til cake.

Do. 2nd group ... =3 lbs. undecorticated cotton cake,
2 „ meal (Juar).

This was given over the 1st period when ploughing and reduced by one lb. of cotton seed and cotton cake in the 2nd period when engaged daily in *bakharing*.

Six animals were employed in each feed. The work of each pair was as uniform as possible, No. 1 of each group forming one working pair, No. 2 a second pair and so on. In the first stages all were employed with the ploughs and later they were engaged with bakhars.

Weighings were made each morning for a week at a time. Fodder was supplied at the rate of 20 lbs. a day per head. In the first month this was wheat and gram bhusa, and latterly juar karbi, in both cases it was chaffed.

Group I.			
Serial No.	1st weighing 21—27—4 average.	2nd weighing 22—28—5 average.	3rd weighing 11—17—6 average.
1	2	3	4
	Md. srs.	Md. srs.	Md. srs.
1	12 13	12 3	12 6
2	14 14	14 4	13 39
3	12 34	12 23	12 21
4	11 19	11 16	11 19
5	12 10	12 25	12 6
6	13 31	13 26	13 23
Average ...	12 35	12 31	12 26
Weights ...	1,030 lbs.	1,022 lbs.	1,012 lbs.
Average loss	in each period	8 lbs.	14 lbs.

Group II.			
Serial No.	1st weighing 21—27—4 average.	2nd weighing 22—28—5 average.	3rd weighing 11—17—6 average.
1	2	3	4
	Md. srs.	Md. srs.	Md. srs.
1	11 3	10 35	10 31
2	14 13	13 32	13 31
3	12 20	12 7	12 2
4	10 17	10 18	10 14
5	11 39	11 22	11 8
6	14 15	14 6	13 32
Average ...	12 18	12 7	12 0
Weights ...	996 lbs.	974 lbs.	960 lbs.
Average loss	in each period	22 lbs.	14 lbs.

The diet A may be said to have been rich in oil and proteid and diet B richer in carbohydrates. Group I regularly consumed throughout the period a slightly greater amount of coarse fodder. In comparing diet 2 with 4 of the previous test, it was lower in oil and proteid. The experiment is inconclusive, but apparently the percentage of grain in the second diet has been in excess when combined with a food of the character of cotton seed cake, and might have been improved by a slight addition of pulse. The cost of the concentrated diets in each case is practically the same.

Report of the Economic Botanist, Central Provinces, for 1912-1913.

Special attention was given to rice, juar, wheat and the genus Capsicum, while cotton, sunn hemp, bajra (*Pennisetum typhoideum*), til (*Sesamum indicum*) and a number of Cucurbitas were grown under observation.

Rice. An attempt was made to write up the varieties of rice grown in these Provinces. The amount of material to be worked through proved so great that it was found impossible to complete the work within the year. In order to help workers in other Provinces it was decided to publish a preliminary note giving the method of classification. This note has been sent to Pusa and it is hoped it will soon make its appearance.

Testing of selected lines of rices was continued in Telinkheri, Tharsa, Sindewahi, Raipur and Adhartal Farms. Reports on these rices will presumably be found in the reports of the respective Farms. No information has been received directly from any of the farms.

Juar. Three varieties were selected from the pure lines grown last year. These were handed over to the Principal of the Agricultural College for further trial. The examination of the natural crosses has been continued. Sufficient material has now been collected to enable this problem to be written up, and it is hoped that time will be found during the current year to do this.

Wheat. The power of resistance to attacks of rust in various pure culture wheats has been studied in co-operation with Deputy Director of Agriculture, Northern Circle. Adhartal Farm, Jubbulpore, forms an ideal spot for carrying out these observations. During the last two years attacks of all three rusts have been experienced there.

Capsicum. Only selection work was carried out on this crop during the past year. The demand for seed of the early round chillie has been great and some little difficulty has been found in meeting it. In Mandla District, through the activity of Mr. Hanuman Prasad, Assistant Inspector of Schools, seed has been distributed to all the schools.

The importance of the chillie may be gathered from the fact that ten lakhs worth of chillies are annually imported into the Central Provinces. The average agricultural labourer spends one rupee in ten of his income on chillies. The introduction of this early round chillie which can be grown without irrigation ought to mean a considerable saving in the weekly bazar bill.

Sunn hemp. Further progress was made with the investigation of the varieties of this crop. It has been found possible to grow the crop very successfully under irrigation in the hot weather, and it will therefore be possible to run through two generations in one year.

Bajra (*Pennisetum typhoidium*). There has been some demand for Natal bajra though not so much as might have been expected from the excellence of the variety. Further selection work has been carried out in this crop.

Cucurbitas. The Jalgaon melon, a variety of *cucumis sativus*, in spite of the small size of the fruit, has proved the most popular of the three varieties selected. The Tapti Valley variety of *Citrullus vulgaris* has maintained its popularity. So great has been the success of this work that it is proposed to grow those varieties in order to supply Pachmarhi, and also near Jubbulpore.

Herbarium. During the cold weather a fair number of new species was obtained from or near Jubbulpore. The common weeds found near Nagpur belonging to the natural orders *Eriocaulaceæ*, *Cyperaceæ* and *Gramineæ* were worked up during the year. In order to make the list usefuly

at the other stations the common sedges and grasses from those places were also included in the list. This list forms the second part of the " Wild Plants of Nagpur " and completes the farm flora.

Mycology.

Mr. P. A. Pandit resigned his appointment in January and his place was not filled during the year. The most important work in this section is the breeding of rust resistant wheats.

Other work.

The Botanical garden, originally started as a stop gap four years ago, is still in existence. The larger area round the new laboratory, which was to have taken its place in 18 months, is still covered with mountains of bricks. Although the present garden is now overcrowded its popularity has still been maintained.

The collection of local ferns has been a distinct success. By confining attention to the Provinces ferns it has been possible to gather a unique collection. This would not have been the case had ferns from all over India been included. Four species of Eucalyptus (*Eucalyptus citriodora, Eucalyptus resinifera, Eucalyptus Smithi, Eucalyptus patentinervs*) were planted out during the rains. Of these, the only plants to survive were those of *Eucalyptus citriodora* and one plant of *Eucalyptus resinifera*. All the surplus stock of *Eucalyptus citriodora* was sent to the Cantonment Magistrate, Jubbulpore, who kindly undertook to see to its distribution. A large number of edible tubers were sent in from the districts in response to a request from Calcutta for specimens of *Ceropegia*. The following *Ceropegia* were received, Daknikund (Nagpur) and Dudhmalida (Amraoti), *Ceropegias bulbosa*, Suparikund (Nagpur) *Ceropegia hirsuta*, Gautikund (Nagpur) and *Ceropegia juncea*.

In co-operation with Mr. D'Abreu, Assistant Curator of the Central Museum, who is investigating the food of birds in the Central Provinces, a large number of seeds were identified. Perhaps the most interesting food was the bulbils of *Dioscorus bulbifera* found in Grey Partridge and Red Spur fowl.

Guayule (*Parthenium argenteum*) grown on light gravelly soil throve throughout the year and in the hot weather commenced flowering. There is no doubt that the plant can be grown at Nagpur, and the question now is whether it can adapt itself to the barren desert hill sides for which it is intended.

The experiment with wild fibre plants proved, as was to be expected, a failure. It is hardly likely that any wild plant has been overlooked by the natives of India in the search for the best fibre plant. *Crotalaria juncea* and *Hibiscus cannabinus* meet all his requirements. It may be mentioned that the sowing of seed in the hot weather gave as good germination as that of treated seed sown after the monsoon had set in.

Requests for seed and plants were received from several sources. The seeds sent out were chiefly rice, cotton, capsicum and bajra. At the request of the Economic Botanist to the Botanical Survey of India an investigation was made into the varieties of Sword Beans (*Canavalia ensiformis*) grown in the Central Provinces; altogether six varieties occur, the most striking being a sub-erect dwarf form. The other varieties differed simply in the colour of the flowers and seeds. Seed of three varieties was sent to Calcutta.

Tour.

During the year all the experimental stations were visited. The Assistant Botanist visited Raipur, Jubbulpore, Hoshangabad and Akola in the cold weather and in the hot weather again spent some time in the north of the Provinces in connection with his work on Cucurbitas.

Publications.

During the year the following papers have been written:—(1) The Flora of Ramtek Hill; (2) Nagpur Grasses and Sedges; (3) A preliminary note on the Rices of the Central Provinces; (4) How Plants live.

Until the departure of Mr. P. A. Pandit the work was distributed amongst the staff as in former years. From January Mr. Pandit's work was divided amongst the rest of the staff. The loss of Mr. Pandit's services is a serious one to the section. An exceptionally capable systematist, he was able and willing to turn his hand to anything. Mr. Gregory has once again tended the Botanical Garden as the apple of his eye. His experience extending over 30 years is invaluable. Mr. Kalka Prasad, Assistant Botanist, has done good work. He is highly respected by the students, while his investigation on bajra and capsicum has been most thorough and painstaking.

R. J. D. GRAHAM,
Economic Botanist,
Central Provinces.

NAGPUR :
The 13th August 1913.

Report of the Central Museum, Nagpur, for the year 1912-13.

I.—Finance.

The opening balance at the credit of the Museum on 1st April 1912 was Rs. 698-2-2. The donation made by the Government for the year was Rs. 3,007. Rs. 1,000 was sanctioned for the purchase of show cases in the Natural History section and Rs. 364 reappropriated from the savings under salary of the Archæologist. The amount credited into the Treasury from 1st April 1912 to 31st March 1913 came to Rs. 886-5-10 under all heads making the total receipts Rs 5,955-8-0. The expenditure incurred during the year under the head contingencies amounted to Rs. 4,988-15-6 and the year closed with a balance of Rs. 966-8-6, *vide* details given in Appendix A. The actual expenditure incurred on payment of salaries and travelling allowance amounted to Rs. 3,397-15-9 and Rs. 296-8-0 respectively against Rs. 3,802-10-9 and Rs. 400 provided for in the Budget as detailed in Appendix B.

II.—Public Rooms.

The rooms were let on hire 53 times during the course of the year for theatrical and other purposes as compared with 27 times during the previous year.

III.—Industrial Section.

It has not been possible to carry out the changes proposed in last year's report. A capable collector of ethnological exhibits has not been found and the necessary funds are also lacking. Until those conditions are fulfilled no progress can be made.

IV.—Archæological Section.

The descriptive catalogue of exhibits with its historical introduction which was prepared by Pandit Natesan Aiyer has not yet been received from the Press, the delay being due to the necessity of indenting for special type.

The only additions to this section during the year were two inscribed stones found by Rai Bahadur Hiralal at Damoh. These have been described in the Ephigraphia of the Central Provinces, prepared by Rai Bahadur Hiralal. For six months Rai Bahadur Hiralal was on deputation to enable him to prepare a list of the inscriptions in the Central Provinces. Munshi Abdul Suboor accompanied him for a short time in April in order to decipher certain Muhammadan inscriptions. The list was completed just after the close of the year and is now being printed.

Numismatics.—It was finally decided on the advice of the Hon'ble Mr. H. Nelson-Wright that the catalogue of Hindu coins in its present form should not be published. The revision of this catalogue as well as the cataloguing of the Muhammadan coins will be undertaken by Munshi Abdul Suboor.

One hundred and sixty-six coins were presented to the Coin Cabinet during the year from various sources, details of which are given in Appendix C. Besides the coins for the Cabinet 293 coins were received for sale. Of these, 76 were offered for sale, 16 being sold for a sum of Rs. 38-11-0. 219 were withheld from sale, pending the determination of their value.

V.—Natural History Section.

The excellent progress made in this section by Mr. D'Abreu has been fully maintained during the year under report. The placing of descriptive labels besides the systematic labels has been a great success. It is now possible for any English-knowing person to read his way round the "bird room". Important points mentioned in the descriptive labels are illustrated by dissections and

drawings. Undoubtedly the most important fact to be reported is the interest aroused amongst the Indian visitors. Instead of looking in at the door or perhaps walking round the room remarking to his companion "Aré bhai bahutse chiryen hain" the visitor stops in front of the cases and discusses the birds and the drawings. The awakening of the powers of observation must be carefully fostered and it is proposed to introduce a duplicate set of labels in the vernacular.

One new feature has been introduced in the bird room. A case has been set apart to display the birds beneficial to and injurious to agriculture. In each division of the case the skin of the particular bird is shown along with specimens of the food which the bird eats.

The attention of readers interested in Natural History is called to the fact that the Museum employs two taxidermists whose services are available for touring. They will assist District Officers and others interested in Natural History who happen to be touring in good collection grounds.

Birds.—During the year 114 birds were collected; 30 were from Nagpur itself, 30 from Chanda, 33 from Jubbulpore, 12 from Balaghat, 8 were sent in by Mr. Donald from the Melghat, and one from Harda by Mr. Tucker. Of these, 78 specimens were placed in the show cases. Half the collection has now been completely labelled.

Among the additions to the local birds collection may be mentioned two birds which hitherto have not been recorded in the Central Provinces. These are Hodgsoris Fishing Eagle (*Policætus humilis*) sent in from the Melghat by Mr. Donald and the Himalayan yellow-backed sun-bird (*Aethopyga seheriæ*) collected by Mr. D'Abreu at Lougher in the Balaghat District, An account of the latter will be published in the Journal of the Bombay Natural History Society.

A set of 38 specimens, consisting chiefly of foreign birds and duplicate local ones, was presented to the Raipur Museum.

Small Mammals.—19 specimens were added to the collection and the Bombay Natural History Society presented a set of 50 skins, chiefly rats, bats, hares and squirrels, collected by their Mammal Survey in the Western Central Provinces.

Tours.—A short tour was made in the Chanda District in December; the month of February was spent collecting in the Jubbulpore District. A short tour was made to Balaghat in the end of March. 75 specimens were collected while on tour.

Publications.—A catalogue of the local birds in the Museum is in the Press; this catalogue also contains a list of the birds wanted by the Museum to complete the collections and will be of use to helpers at a distance.

Visitors.—The total number of male visitors during the year was 109,496, the total number of female visitors was 42,065, making a grand total of 151,561. The average number per day was 415. This is an increase of 56 per day over last year's figure, or an increase of nearly 150 per day within the last two years. This remarkable increase can only be accounted for by the increased popularity of the Natural History Section. As pointed out above, it is the most hopeful feature in this report. An institution which can attract four hundred people a day can do much to educate the people of Nagpur and it is to be hoped that neither lack of funds nor accommodation may be allowed to hinder the extension of the work of the Museum in this direction.

VI.—ESTABLISHMENT.

The number of posts sanctioned on the establishment remained unaltered during the year.

The Museum is open daily from 7 A. M. to 6 P. M., except on Wednesdays from mid-day when the Museum is reserved for female visitors. The average number of visitors availing themselves of this privilege was 200.

The sale of locally manufactured brass ware was continued throughout the year. No better success was met with than in the previous year and the sale will now be discontinued.

During the year three cases were reported of the servants in the Museum accepting gratuities from visitors. It is only by the strictest supervision that this practice can be stopped.

R. J. D. GRAHAM,
Curator, Central Museum,
Nagpur.

APPENDIX A.

Contingent expenditure incurred during the year ending the 31st March 1913.

Details of heads.	Actuals.	Total.
Receipts.	Rs a p.	Rs. a. p.
Opening balance on 1st April 1912	608 2 2	.....
Allotment for 1912-13	4,371 0 0	.....
Amount credited into the treasury	886 5 10	5,955 8 0
Expenditure.		
Miscellaneous	2,530 0 0	.....
Servants paid from Contingencies	487 5 10	.....
Purchase and repair of furniture	1,797 12 0	.....
Postage and Telegram charges	20 3 0	.....
Stationery	16 11 0	.....
Municipal Taxes	59 8 0	.....
Purchase of books	27 0 0	.....
Hot weather charges	(*a*) 60 14 8	(*a*) 4,988 15 6
Closing balance on 31st March 1913 ...		966 8 6

APPENDIX B.

Statement showing the salaries of establishment of the Central Museum, Nagpur, during the year ending the 31st March 1913.

Name of sub-head and district.	Class of charges.	Details.	Budget allotment.	Actuals.	Remarks.
			Rs. a. p.	Rs. a. p	
26.—Scientific and other Minor Departments, Nagpur.	Salary ...	Archæologist ...	400 0 0	...	
	do. ...	Assistant Curator ...	1,290 0 0	1,880 0 0	
	do. ...	Clerk ..	534 10 9	584 0 4	
	do. ...	Custodian ...	216 0 0	216 0 0	
	do. ...	Servants ...	732 0 0	717 15 5	
		Total ...	3,802 10 9	3,397 15 9	
	Allowance ...	Travelling allowance ...	400 0 0	296 8 0	

APPENDIX C.

Statement showing the number of coins received in the Central Museum, Nagpur, during the year ending the 31st March 1913.

Serial No.	Donor's Name.	Number of Specimens.					
		Gold.	Silver	Copper.	Billon.	Mixed.	Total.
1	Director of Agriculture, Central Provinces ...	10	90	5	...	...	105
2	Superintendent, Rajputana Museum ...	...	...	...	22	...	22
3	1st Assistant to Governor General in Central India, Indore ...	...	3	...	...	...	3
4	Bombay Branch Royal Asiatic Society ...	...	3	1	...	...	4
5	Collector of Saran Chapra ...	...	1	...	..	...	1
6	Numismatic Secretary, Asiatic Society Bengal, Bareilly ...	1	22	...	...	...	23
7	Collector of Muzaffarpur ...	..	1	...	..	...	1
8	Superintendent, Government Museum, Madras ...	2	1	2	...	...	5
9	District Officer of Champaran (Behar and Orissa) ...	2	...	...	...	...	2
	Total ...	15	121	8	22	...	166

R. J. D. GRAHAM,
Curator, Central Museum,
Nagpur.

Report of the Agricultural Chemist for the year ending June 30th, 1913.

The assistant staff remains as in the previous year, and I have much pleasure in recording my appreciation of the manner in which Messrs. Padmanabha Iyer and Ram Narayan carry on their work under trying and often unpleasant conditions. Good ventilation is absolutely necessary in a chemical laboratory if a healthy atmosphere is to be maintained, but the present arrangements are very inadequate in this respect.

It is unnecessary in this report to deal with the instructional work carried on in connection with the Agricultural College, as reports upon the various classes held in physics, general and agricultural chemistry, have already been forwarded to the Principal, Agricultural College. Two new lines of work of an educational nature were undertaken during the past year. In addition to giving a series of lectures to Assistant Commissioners during their agricultural course, at the request of the Settlement Officer, Nagpur, I gave a series of demonstrations on soils and the principles of soil classification to his settlement and soil-classing staff. This course proved to be of a very interesting nature and I have a great desire to see work of this kind increase. It must be realized that the proper classification of soils is based upon a proper understanding of the relationship of a soil's constituents to crop production. Further, to obtain uniformity in classification it is very desirable that the soil classing staff should be trained on uniform lines and this appears to me to be particularly the work of an Agricultural Department.

The analytical work carried on in the laboratory continues to increase in quantity and become more varied in nature, and in this matter the insufficiency of our laboratory accommodation is keenly felt. It is impossible to carry out all kinds of analysis in one room, so certain work has to be taken to lecture room or verandah, places not always available or convenient.

The following samples have been dealt with in the laboratory during the past year in addition to special work referred to later:—

Soils	...	...	...	5
Manures	...	...	...	33
Oil cakes	...	...	...	14
Fodders	...	...	...	19
Dairy Products	...	...	...	31
Lime-stones	...	...	...	4
Oil-seeds	...	...	...	45
Miscellaneous	...	...	...	2

A number of soils were received from Tharsa Farm on land where wheat had failed to do well and the question was raised whether the presence of injurious salts in the soil might not be the cause of the failure. Water extracts of the soils were made, in which young wheat plants were put to grow. None of the extracts proved injurious to plant growth and it was suggested that the cause of the trouble might be found in water-logging, or some similar physical defect in the soil. This was subsequently proved to be the case.

At the request of the Executive Engineer in charge of Mahanadi Head Works, a number of soils were examined with a view to determining their relative water-retaining power and permeability. The soils were to be used in the construction of a *bund* and as the outlay on the work amounted to sixteen lakhs it was thought desirable to obtain any information which would help in the selection of the right material. To this end thirty-two samples were divided up into their relative proportions of various grades of material, from coarse sand to the finest clay, and then arranged in order of their permeability and impermeability to water.

Sugarcane analysis has been continued on the same lines as in the previous year. At Telinkheri, where a large number of varieties are grown for trial, series of analyses were made at intervals during the ripening season; but it is necessary to grow a cane on a large scale in the field before anything more than a rough idea of its quality can be determined. A cane may have a high sucrose content and co-efficient of purity and yet yield a low tonnage of sugar per acre when tried in the field. At Tharsa ten varieties were kept under observation and the composition of their juices determined at intervals of about a fortnight during the ripening period. These varieties all took one year or more before they had reached their richest and purest state but the co-efficient of purity and sucrose content of some varieties, *e. g.*, *Pounda* and *Langi* are higher earlier in the season than is the case with *Pundia* and Red Mauritius This is a matter of importance in extending the harvesting season and will continue to receive attention both at Tharsa and on other types of soil.

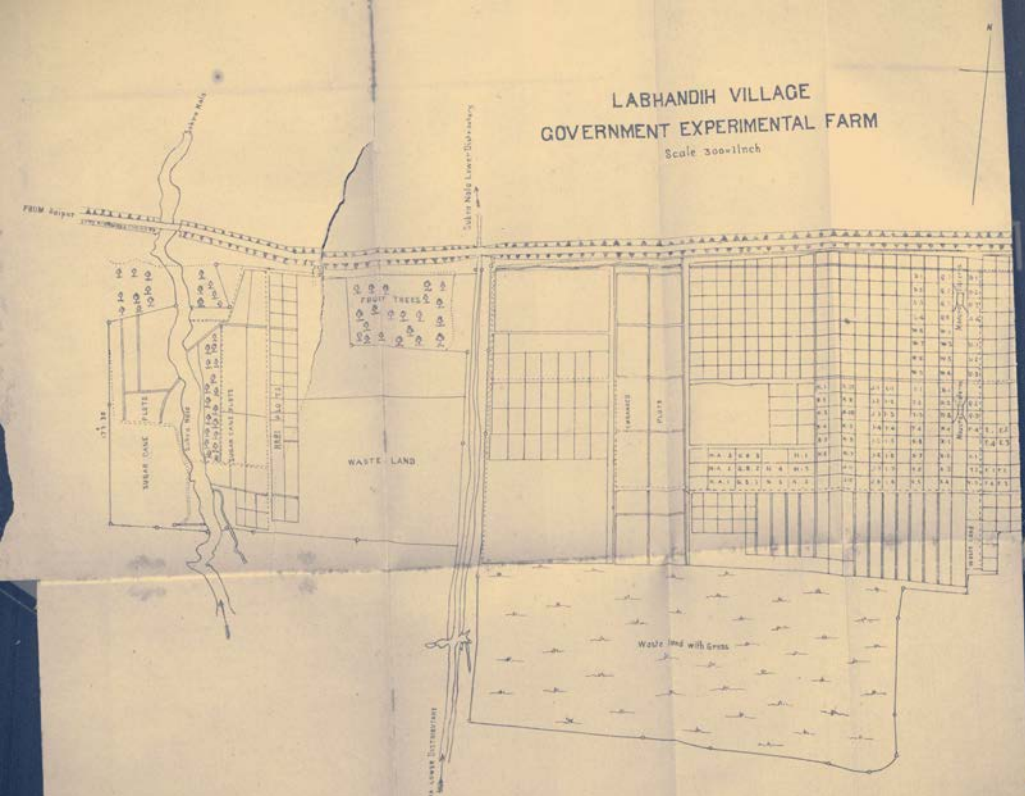
In connection with work in Physics, a subject taught by one of the staff of the chemical section, a small weather station has been established during the past year. The equipment consists of self-recording instruments for various purposes, the object being to determine more closely the relationships between meteorological conditions and crop growth.

NAGPUR:
The 18th August 1913.

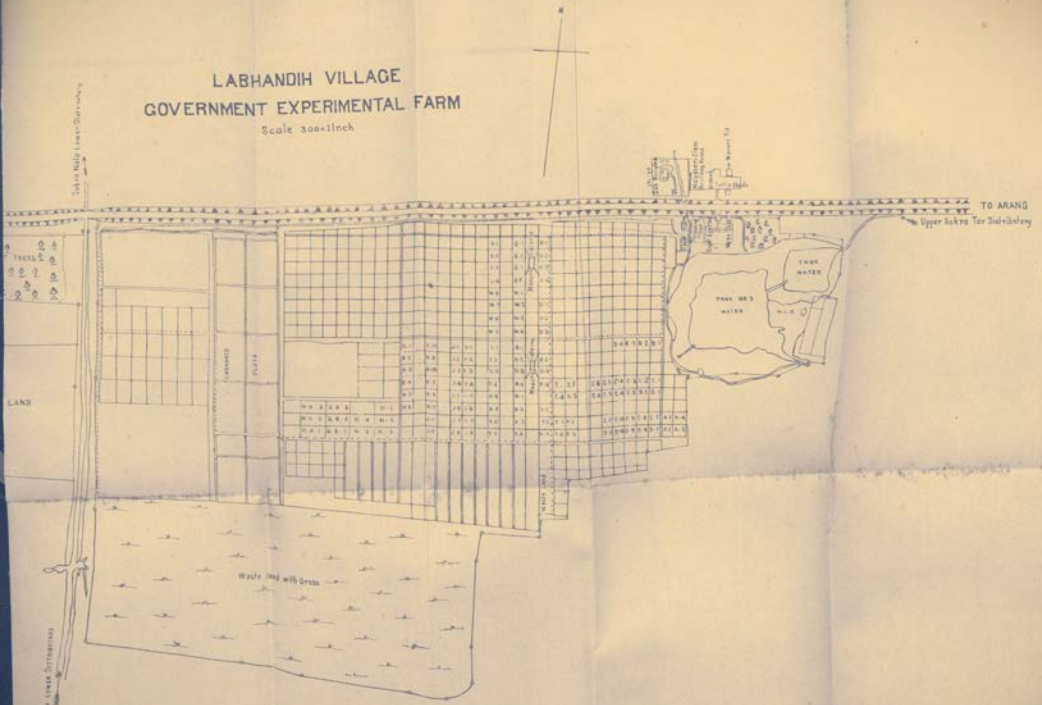
F. J. PLYMEN,
Agricultural Chemist,
Central Provinces.

LABHANDIH VILLAGE
GOVERNMENT EXPERIMENTAL FARM

Scale 300=1inch



Printed at Office of Supdt. Govt. Printing Nagpur, C.P.


LABHANDIH VILLAGE
GOVERNMENT EXPERIMENTAL FARM
Scale 300=1Inch
N
TO ARANG
Upper Sukra Tar Distributary
TANK WATER
TANK NO 3 WATER
LAND
Waste land with Grass
Printed at Office of Supdt. Govt. Printing Nagpur, C.P.

Report on the Raipur Agricultural Station, 1912-13.

The Raipur Agricultural Station occupies an area of 224 acres of which 60 are under grazing. It lies on a gentle slope, which includes typical samples of *matasi, dorsa* and *kanhar* soil. The *matasi* area is reserved solely for rice, the *dorsa* for rice followed by pulses or wheat, and the *kanhar* for wheat and sugarcane. Analyses of these three classes of soil are given below :—

	Matasi.	Dorsa.	Kanhar.
	Acres.	Acres.	Acres.
Insoluble silicates and sand	87·41	74·68	69·73
Ferric oxide	4·12	6·71	7·64
Alumina	4·78	11·43	13·83
Lime	0·28	0·85	1·05
Magnesia	0·30	0·81	0·75
Potash	0·43	0·86	0·79
Soda	0·13	0·20	0·25
Phosphoric acid	0·02	0·02	0·02
Sulphuric acid	Very little.	...	...
Carbonic acid	0·13	0·09	0·08
Organic matter and combined water	2·40	4·35	5·86
Total ...	100·00	100·00	100·00
Total nitrogen ...	0·053	0·041	·036
Available phosphoric acid	·001	·001	·001
„ potash	0·10	·011	·012

2. The farm occupies a central position in the most backward tract of these Provinces, where the methods of cultivation are primitive and the standard low. The staple kharif crops are rice, kodo and kutki, and the rabi crops, wheat and oil seeds. The area under rice alone is over three million acres, almost the whole of which is sown broadcast (*biasi*). The entire non-experimental area under rice on the farm is transplanted every year, this method of cultivating rice was demonstrated in 2,163 villages last year.

3. With the view of extending the cultivation of sugarcane and ground-nut in this Division, a considerable area of each of these is grown on the farm for demonstration purposes and for distribution.

Plant-to-plant selection of some of the best rices under trial was started four years ago. There is now a large quantity of selected *gurmatia* paddy available for distribution. Paddy seed-farms are being opened this year with the view of getting the selected strains introduced into general cultivation. The paddy grown at present is largely mixed with wild rice, which greatly reduces its value. So long as rice is broadcasted instead of being transplanted, it will be almost impossible to kill out the wild varieties which are self-sown. In transplantation the fields being thoroughly puddled about a month after the rains break, everything in the way of weeds is killed out in the plots in which the seedlings are to be planted out. Sugarcane on the farm was a good crop. It was protected from damage by pigs by using patent pig fencing.

A practical class for the training of men in rice cultivation was held on the farm during the rains as usual : 17 men attended it and were granted certificates on completing their courses.

The divisional meeting of the Chhattisgarh Agricultural Association held on the farm in December was attended by over 1,000 people. The Commissioner of the Division and the Deputy Commissioners of Drug and Raipur and several other officials were present. A cattle show and ploughing match were held on the farm in January.

Under the management of Ramcharan Lal as Superintendent the farm has been much improved, the work of the whole staff has been very satisfactory.

Statement of rainfall for the year 1912-13.

Month.		Number of days.	Rainfall.
1		2	3
			Inch.
July ...	1st half	10	10·68
	2nd half	13	6·73
August ...	1st half	12	16·26
	2nd half	6	3·69
September ...	1st half	7	5·00
	2nd half	2	1·91
October ...	1st half	1	·17
	2nd half	1	·02
November ...	1st half	...	...
	2nd half	2	·23
December ...	1st half	...	...
	2nd half	...	...
January ...	1st half	...	...
	2nd half	...	...
February ...	1st half	3	1·64
	2nd half	3	1·78
March ...	1st half	3	·60
	2nd half	...	...
April ...	1st half	...	...
	2nd half	...	...
May ...	1st half	...	...
	2nd half	3	·28
June ...	1st half	2	2·40
	2nd half	6	6·41
	Tatal ...	...	57·80

EXPERIMENTS.

SUBJECT.—To compare the outturns of broadcasted (*biasi*) with transplanted rice. Irrigation to be given only if necessary to prevent withering.

CROP.—*Parewa* paddy—a medium variety.

Plot.	Outturn in lbs. per acre.						
	Average for 9 years including 1912-13.		For 1912-13.				
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Cost of cultivation and seed.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanted ...	1,398	1,158	1,470	1,390	41 6 0	9 11 0	31 11 0
Biasi ...	982	890	1,070	870	29 5 0	13 14 0	15 7 0

Transplantation has accounted for an average increase of 416 lbs. of grain per acre or 42 per cent over the outturn of *biasi*. Transplantation has this year given an increase of 400 lbs. of grain and an increased profit of Rs. 16 over that of *biasi*. The variety of rice grown was a medium one.

The cost of cultivation in this and the three other series in which transplantation and *biasi* are compared, includes the price of seed. For transplantation the seed-rate is 20 lbs. per acre; for *biasi* the seed-rate used on the farm is 100 lbs.

SUBJECT.—To compare the outturns of broadcasted (*biasi*) with transplanted rice. Irrigation to be given only if necessary to prevent withering.

CROP.—*Gurmatia* paddy—a late variety.

Plot.	Outturn in lbs. per acre.						
	Average for 5 years including 1912-13.		For 1912-13.				
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Cost of cultivation and seed.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanted ...	1,400	1,300	1,520	1,870	49 11 0	9 11 0	40 0 0
Biasi ...	954	954	980	910	31 0 0	13 14 0	17 2 0

Transplanted as compared with broadcasted (*biasi*) late rice has in this series given an average increase of 446 lbs. of paddy; the increase this year has risen to 540 lbs. and the profit to nearly Rs. 23.

SUBJECT.—To compare the outturn of irrigated broadcasted (*biasi*) with irrigated transplanted rice.

VARIETY.—*Parewa*—a medium paddy.

Plot.	Outturn in lbs. per acre.						
	Average for 9 years including 1912-13.		For 1912-13.				
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Cost of cultivation and seed.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanted ...	1,677	1,426	2,010	2,080	57 3 0	9 11 0	47 8 0
Biasi ...	1,951	1,156	1,480	1,430	41 12 0	13 14 0	27 14 0

The average increase due to the transplantation of an irrigated medium paddy in this experiment has over a period of nine years been 426 lbs. The increase during the year under report was 530 lbs. per acre and the profit nearly Rs. 20.

SUBJECT.—To compare the outturns of irrigated broadcasted (*biasi*) with irrigated transplanted rice.

VARIETY.—*Gurmatia*—a late paddy.

Plot.	Outturn in lbs. per acre.						
	Average for 5 years including 1912-13.		For 1912-13.				
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Cost of cultivation and seed.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanted ...	1,980	1 692	2,620	2,440	83 0 0	9 11 0	73 5 0
Biasi ...	1,402	1,254	1,780	1,540	56 0 0	13 14 0	42 2 0

Late transplanted rice in this series has for the last five years given an average increase of 578 lbs. The increase obtained from the transplanted plot this year has risen to 840 lbs. and the profit to Rs. 31.

Taking the average for the four experiments, we find that for the year under report, transplantation has given an increase of 577 lbs. of paddy, which is equivalent to an increase of 44 per cent on the average yield of the broadcasted plots in the four different series and that the average profit has been about Rs. 16 per acre. With these facts before us it is hard to understand why the Department should have so much up-hill work in introducing this improved method of cultivating rice.

SUBJECT.—To compare the values of different manures for transplanted rice grown without irrigation :—

PLOT. I.—Cattle-dung 20 lbs. nitrogen per acre.
" II.—Calcium cyanamide 20 lbs. nitrogen per acre as top-dressing.
" III.—Bone-dust 20 lbs. nitrogen per acre.
" IV.—Bone-dust 10 lbs. nitrogen and saltpetre 10 lbs. nitrogen as top-dressing.
" V.—Dried leaves of trees 20 lbs. nitrogen per acre.
" VI.—Tank-silt 640 maunds per acre.
" VII.—Castor-cake 20 lbs. nitrogen per acre.
" VIII.—One year old poudrette 20 lbs. nitrogen per acre.
" IX.—Night-soil after Meagher system applied in the month of April every third year.
" X.—Bone-dust 10 lbs. nitrogen and sulphate of ammonia 10 lbs. nitrogen per acre as top-dressing.
" XI.—Unmanured.

No. of Plot.	Outturn in lbs. per acre.								
	Average for 9 years including 1912-13.		For 1912-13.						
		Straw.	Grain.	Straw.	Value of outturn.	Increase due to manure.	Cost of manure.	Profits or loss due to manure.	
								Profit.	Loss.
1	0	3	4	5	6	7	8	9	10
					Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	1,343	1,189	1,370	1,200	38 4 0	19 11 0	2 8 0	17 3 0	...
II ...	1,042	1,018	1,080	770	29 9 0	11 0 0	14 6 0	...	3 6 0
III ...	1,783	1,648	2,150	1,800	59 12 0	41 3 0	20 6 0	20 13 0	...
IV ...	1,491	1,377	1,880	1,610	52 6 0	33 13 0	19 13 0	14 0 0	...
V ...	954	857	880	760	24 8 0	5 15 0	1 4 0	4 11 0	...
VI ...	1,216	1,091	1,420	1,210	39 8 0	20 15 0	2 8 0	18 7 0	...
VII ...	1,330	1,140	1,570	1,260	43 7 0	24 14 0	11 11 0	13 3 0	...
VIII ...	1,688	1,406	2,440	1,630	66 6 0	47 13 0	2 8 0	45 5 0	...
IX ...	2,199	2,638	2,080	1,400	56 10 0	38 1 0	3 2 0	34 15 0	...
X ...	1,214	1,037	2,100	1,400	57 2 0	38 9 0	16 5 0	22 4 0	...
XI ...	723	633	680	470	18 9 0	...	...	...	...

Before applying these manures in the year under report all the plots were cropped with san hemp, which was ploughed in later as a green manure, the object being to raise the fertility of the unmanured plot without affecting the relative fertility of the different plots of the series. This was necessary as the check plot after eight years of continuous cultivation without manure had become very impoverished. The effect was marvellous; the san hemp did extraordinarily well in Plots 3, 4 and 10, which receive bone-dust every year and the combination of the two manures resulted in an unusually large yield from these plots.

2. Calcium cyanamide has invariably accounted for a considerable increase in Plot 2 but the value of that increase has not covered the cost of the manure.

3. Night-soil and poudrette are the most profitable manures applied in this series; cattle dung, castor-cake and tank silt have also given a profit.

SUBJECT.—To compare the values of different manures for *biasi* rice grown without irrigation :—

PLOT I.—Cattle dung 20 lbs. nitrogen per acre.

„ II.—Calcium cyanamide 20 lbs. nitrogen per acre as top-dressing.

„ III.—Bone-dust 20 lbs. nitrogen per acre.

„ IV.—Bone-dust 10 lbs. nitrogen and saltpetre 10 lbs. nitrogen as top-dressing.

„ V.—Dried leaves of trees 20 lbs. nitrogen per acre.

„ VI.—Tank-silt 640 maunds per acre.

„ VII.—Castor-cake 20 lbs. nitrogen per acre.

„ VIII.—One year old poudrette 20 lbs. nitrogen per acre.

„ IX.—Night-soil after Meagher system done in the month of April every third year.

„ X.—Bone-dust 10 lbs. nitrogen and sulphate of ammonia 10 lbs. nitrogen per acre as top-dressing.

„ XI.—Unmanured.

No. of Plot.	Outturn in lbs per acre.								
	Average for 9 years including 1912-13.		For 1912-13.						
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Increase due to manure.	Cost of manure.	Profit or loss due to manure.	
								Profit.	Loss.
1	2	3	4	5	6	7	8	9	10
					Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p
I ...	1,086	1,014	1,110	1,040	31 3 0	22 14 0	2 8 0	20 6 0	...
II ...	841	916	1,020	890	38 7 0	30 2 0	14 6 0	15 12 0	...
III ...	1,171	1,140	1,260	1,540	36 10 0	28 5 0	20 6 0	7 15 0	...
IV ...	869	7-9	740	760	21 0 0	12 11 0	19 13 0	...	7 2 0
V ...	609	582	700	670	19 12 0	11 6 0	1 4 0	10 2 0	...
VI ...	833	824	440	560	12 14 0	4 8 0	2 8 0	2 0 0	...
VII ...	888	978	1,180	1,260	32 7 0	24 2 0	11 11 0	12 5 0	...
VIII ...	946	876	1,240	1,330	35 7 0	27 1 0	2 8 0	24 9 0	...
IX ...	1,136	1,396	1,010	1,200	29 4 0	20 14 0	3 2 0	17 12 0	.
X ...	657	686	1,070	1,160	36 6 0	28 0 0	16 5 0	11 11 0	...
XI ...	328	308	290	330	8 6 0	...	...	...	...

SUBJECT.—To compare the values of different manures for irrigated transplanted rice :—

PLOT I.—Cattle dung 20 lbs. nitrogen per acre.

„ II.—Calcium cyanamide 20 lbs. nitrogen per acre as top-dressing.

„ III.—Bone-dust 20 lbs. nitrogen per acre.

„ IV.—Bone-dust 10 lbs. and saltpetre 10 lbs. nitrogen as top-dressing.

„ V.—Dried leaves of trees 20 lbs. nitrogen per acre.

„ VI.—Tank-silt 640 maunds per acre.

„ VII.—Castor-cake 20 lbs. nitrogen per acre.

„ VIII.—One year old poudrette 20 lbs. nitrogen per acre.

„ IX.—Night-soil after Meagher system done in the month of April every third year.

„ X.—Bone-dust 10 lbs. nitrogen and sulphate of ammonia 10 lbs. nitrogen per acre as top-dressing.

„ XI.—Unmanured.

No. of Plot.	Outturn in lbs per acre.								
	Average for 4 years including 1912-13.		For 1912-13.						
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Value of increase.	Cost of manure.	Profit or loss due to manure.	
								Profit.	Loss.
1	2	3	4	5	6	7	8	9	10
					Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	1,087	982	1,530	1,220	42 5 0	17 11 0	2 8 0	15 3 0	...
II ...	955	892	1,240	950	33 4 0	8 10 0	14 6 0	...	5 12 0
III ...	1,457	1,107	2,200	1,460	59 14 0	35 4 0	20 6 0	14 14 0	...
IV ...	1,117	896	1,580	1,050	43 0 0	18 6 0	19 13 0	...	1 7 0
V ...	747	691	780	670	21 12 0	...	1 4 0	...	4 3 0
VI ...	929	898	1,200	1,100	33 11 0	9 1 0	2 8 0	6 9 0	...
VII ...	634	556	990	840	27 5 0	2 12 0	11 11 0	...	8 15 0
VIII ...	1,208	1,194	1,300	1,100	36 3 0	11 9 0	2 8 0	9 1 0	...
IX ...	1,907	1,695	1,900	1,380	52 2 0	27 8 0	3 2 0	24 6 0	...
X ...	1,042	980	1,540	1,190	42 7 0	17 14 0	16 5 0	1 9 0	...
XI ...	565	557	880	780	24 10 0	...	...	...	...

In this series too, san hemp was ploughed in in all the plots with the view of raising the general standard of fertility. This was necessary as the outturns of the check plot which had not been manured for five years had, owing to continuous cropping, gone on decreasing to such an extent that for comparative purposes the results were misleading. The green manure had a surprising effect in increasing the yields; this was most evident in Plot No. III, which has been manured with bone-dust for the last four years

SUBJECT.—To compare the values of different manures for irrigated *biasi* rice :—

PLOT. I.—Cattle dung 20 lbs. nitrogen per acre.

„ II.—Calcium cyanamide 20 lbs. nitrogen per acre as top-dressing.

PLOT III.—Bone-dust 20 lbs. nitrogen per acre.

„ IV.—Bone-dust 10 lbs. nitrogen and saltpetre 10 lbs. nitrogen as top-dressing.

„ V.—Dried leaves of trees 20 lbs. nitrogen per acre.

„ VI.—Tank-silt 640 maunds per acre.

„ VII.—Castor-cake 20 lbs. nitrogen per acre.

„ VIII.—One year old poudrette 20 lbs. nitrogen per acre.

„ IX.—Night-soil after Meagher system done in the month of April every third year.

„ X.—Bone-dust 10 lbs. nitrogen and sulphate of ammonia 10 lbs. nitrogen per acre as top-dressing.

„ XI.—Unmanured.

No. of Plot.	Outturn in lbs. per acre.								
	Average for 5 years including 1912-13.		For 1912-13.					Profit or loss due to manure.	
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Value of increase.	Cost of manure.	Profit.	Loss.
1	2	3	4	5	6	7	8	9	10
					Rs. a.	Rs. a.	Rs. a.	Rs. a.	Rs. a.
I ...	764	760	760	640	21 2	9 5	2 8	6 13	...
II ...	686	702	730	750	20 12	8 15	14 6	...	5 7
III ...	1,196	1,126	1,250	1,150	35 1	23 4	20 6	2 14	...
IV ...	866	1,145	910	730	25 3	13 6	19 13	...	6 7
V ...	581	627	440	540	12 13	1 0	1 4	...	0 4
VI ...	689	742	760	670	21 4	9 7	2 8	6 15	...
VII ...	648	672	530	500	14 14	3 1	11 11	...	8 10
VIII ...	946	942	1,040	850	28 13	17 0	2 8	14 8	...
IX ...	1,638	1,418	1,440	1,230	40 1	28 4	3 2	25 2	...
X ...	781	872	660	760	19 0	7 3	16 5	...	9 2
XI ..	377	395	410	470	11 13	...	...	...	...

SUBJECT.—To ascertain the minimum quantity of water required to save a crop of medium (*i*) transplanted and (*ii*) *biasi* rice, in (*a*) *matasi* and (*b*) *dorsa* soil. Plots to be manured annually with cattle-dung 20 lbs. nitrogen per acre.

VARIETY.—*Parewa.*

Plot.	Outturn in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			Dorsa soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a.	lbs.	lbs.	Rs. a.	Cft.	Inches.
Transplanted ...	1,610	1,760	46 2	1,410	1,540	40 6	14,520	45·14
Biasi ...	810	1,030	23 11	810	840	20 9	...	45·14

The year under report was characterised by the lateness of the rains which did not break till the 1st July. The consequence was that one irrigation had to be given for puddling the soil before transplanting. This accounts for more water having been applied to the transplanted than to the *biasi* plots of this and the five succeeding series of irrigation experiments.

SUBJECT.—To ascertain the quantity of water required to produce an average crop of medium (*i*) transplanted and (*ii*) *biasi* rice sown in (*a*) *matasi* and (*b*) *dorsa* soil. Plots to be manured with cattle dung 20 lbs. nitrogen per acre. Each plot to be 10 acre.

VARIETY.—*Parewa*.

Plot.	Outturn in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			Dorsa soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a.	lbs.	lbs.	Rs. a.	Cft.	Inches.
Transplanted ...	1,680	1,740	47 12	1,580	1,500	44 8	21,780	45·14
Biasi ...	1,010	1,140	29 1	940	1,090	29 10	7,260	45·14

SUBJECT.—To ascertain the quantity of water required to produce a good crop of medium (*i*) transplanted and (*ii*) *biasi* rice sown in (*a*) *matasi* and (*b*) *dorsa* soil. Plots to be manured annually with cattle dung 20 lbs. Plot to be ·10 acre each.

VARIETY.—*Parewa* paddy.

Plot.	Outturn in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			Dorsa soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a.	lbs.	lbs.	Rs. a.	Cft.	Inches.
Transplanted ...	1,900	1,930	53 15	1,780	1,870	50 11	32,670	45·14
Biasi ...	1,310	1,440	37 8	1,180	1,170	33 6	14,520	45·14

To derive the full benefit from the irrigation of transplanted rice in a year like that under report it is necessary to apply the first watering at the time of puddling the plot previous to transplanting. This enables the transplanter to complete that operation early.

SUBJECT.—To ascertain the minimum quantity of water required to save a crop of late (*i*) transplanted and (*ii*) *biasi* rice in (*a*) *matasi* and (*b*) *dorsa* soil. Plots to be manured annually with cattle dung 20 lbs nitrogen per acre. Each plot to be ·10 acre.

VARIETY.—*Gurmatia*.

Plot.	Outturn in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			Dorsa soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a.	lbs.	lbs	Rs. a.	C.ft.	Inches.
Transplanted ...	1,560	1,480	49 4	1,390	1,420	44 7	14,520	45·14
Biasi ...	830	940	29 11	680	880	22 5	...	45·14

SUBJECT.—To ascertain the quantity of water required to produce an average crop of late (*i*) transplanted and (*ii*) *biasi* rice sown in (*a*) *matasi* and (*b*) *dorsa* soil. Plots to be manured with cattle dung 20 lbs. nitrogen per acre. Each plot to be ·10 acre.

VARIETY.—*Gurmatia.*

Plot.	Outturn in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			Dorsa soil.				
	Grain.	Straw	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	0
	lbs.	lbs.	Rs. a.	lbs.	lbs.	Rs. a.	C.ft.	Inches.
Transplanted ...	1,460	1,510	46 12	1,610	1,617	51 9	21,780	45·14
Biasi ...	880	850	27 15	1,010	1,040	32 5	7,260	45·14

SUBJECT.—To ascertain the quantity of water required to produce a good crop of (*i*) transplanted and (*ii*) *biasi* late rice sown in (*a*) *matasi* and (*b*) *dorsa* soil. Plots to be manured annually with cattle dung 20 lbs. nitrogen per acre. Each plot to be ·10 acre.

VARIETY.—*Gurmatia.*

Plot.	Outturn in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			Dorsa soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a.	lbs.	lbs.	Rs. a.	C.ft.	Inches.
Transplanted ...	1,680	1,670	53 9	1,580	1,670	50 11	32,570	45·14
Biasi ...	1,190	1,250	38 2	1,160	1,150	36 15	14,520	45·14

SUBJECT.—To ascertain the best spacing distance for tranplanted seedlings plots to be manured with 20 lbs. nitrogen per acre each plot to be ·10 acre.

CROP.—*Gurmatia* paddy.

Spacing.	Outturn per acre in lbs.				
	Grain.	Straw.	Value.	Cost of cultivation.	Profit.
1	2	3	4	5	6
	lbs.	lbs.	Rs. a.	Rs. a.	Rs. a.
Seedlings 4 inches apart ...	1,800	1,820	57 8	11 1	46 7
6 inches apart	1,450	1,410	46 2	10 6	35 12
9 inches ,, ...	1,300	1,270	41 6	9 10	31 12
12 inches ,, ...	960	990	30 12	9 5	21 7
			Duplicate.		
4 inches apart	2,660	2,350	83 14	11 1	72 13
6 inches ,, ...	2,080	2,200	66 12	10 6	56 6
9 inches ,, ...	1,470	1,400	46 11	9 10	37 1
12 inches ,, ...	1,350	1,450	43 6	9 5	34 1

The four-inch spacing has given the largest and most profitable outturn in both series.

SUBJECT.—To ascertain the most economical seedling-rate for transplanted paddy. Plots to be ·10 acre each.

PLOT I.—Single seedlings 6 inches apart.
,, II.—Two seedlings per hole 6 inches apart.
,, III.—Three seedlings per hole 6 inches apart.
,, IV.—Bunches 6 inches apart.

No. of Plot.	Outturn in lbs. per acre.						
	Average for 2 years 1910—12.		For 1912.			Cost of cultivation seed and irrigation.	Profit.
	Grain.	Straw.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a.	Rs. a.	Rs. a.
I ...	2,685	2,825	2,830	2,630	89 7	9 8	79 15
II ...	2,405	2,145	2,620	2,540	83 2	9 13	73 5
III ...	2,395	2,940	2,520	2,710	81 0	10 2	70 14
IV ...	1,900	2,740	2,340	2,440	75 15	10 12	65 3

Not only is seed saved, but the outturn is increased by transplanting single seedlings. This practice has been followed on this farm for years and has been introduced by the Department in every tahsil in the Chhattisgarh Division, where transplantation has been taken up as an entirely new method of cultivating rice. In districts where cultivators have long been accustomed to transplant, they put in bunches instead of single plants; the result is that three-fourths of their seed is wasted and their outturns are less than they would get from a lower seedling-rate.

SUBJECT.—To test the value of san as a green manure for transplanted rice. Plots to be ·10 acre each.

No. of Plot.	Treatment.	Date of ploughing in san hemp.	Date of transplantation.	Outturn per acre in lbs.		Increase due to manure in lbs.
				Average for 2 years 1910—12.	Outturn in 1912.	
1	2	3	4	5	6	7
				lbs.	lbs.	lbs.
I ...	No manure	...	15th August.	1,575	1,190	710
II ...	San hemp ...	14th August.	do.	2,445	1,900	
III ..	No manure ...	...	do. ...	885	930	580
IV ..	San hemp ...	14th August.	do. ...	1,425	1,510	
V ...	No manure ...	...	5th August.	680	840	40
VI ...	San hemp ...	3rd August.	do. ...	990	880	
VII ...	No manure ...	...	do. ...	760	1,020	380
VIII ..	San hemp ..	3rd August.	do. ...	1,347	1,400	

San hemp promises to be a useful green manure. That which was ploughed in in the middle of August had attained a height of about two feet and gave better results than the less bulky crop ploughed in eleven days earlier. In low-lying fields some difficulty is experienced in getting a good stand of san.

SUBJECT.—To compare the values of san hemp and sawri (*Sesbania aculeata*) as green manures for transplanted rice.

CROP.—*Gurmatia* paddy.

Treatment.	Outturn for 1911-12.		For 1912-13.					
	Grain.	Straw.	Date of ploughing green manure.	Date of transplanting.	Outturn in lbs.		Value.	Increase in value due to green manure.
					Grain.	Straw.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.			lbs.	lbs.	Rs. a.	Rs. a.
San ...	570	550	2nd August.	3rd August.	860	850	27 6	11 10
Sawri ...	680	610	do. ...	do. ...	610	630	19 9	3 13
No manure ...	450	433	...	do. ...	500	440	15 12	...
				Duplicate.				
San ...	490	460	14th August.	15th August.	880	840	27 15	8 6
Sawri ...	500	500	do. ...	do. ...	670	640	21 4	1 11
No manure ...	360	370	...	do. ...	610	640	19 9	...

Sawri is a comparatively slow grower, and as the monsoon was very late this year, it could not be sown still the 30th of June. It had attained a height of five inches only before being ploughed in. It is a much hardier species than san and thrives better in waterlogged soil. I anticipate that it will serve our purpose better than san as a green manure for low-lying fields.

SUBJECT.—To test the effect of different methods of tillage on rabi crops without manure. Plots to be ·20 acre each.

PLOT I.—Bakhared.

„ II.—Ploughed with country plough.

„ III.—Ploughed with Ransome's turn-wrest plough.

CROP.—Wheat and gram to be rotated.

No. of plots.	Outturn in lbs. per acre.						
	Average for eight years.		For 1912-13.				
	Grain.	Straw.	Grain.	Straw.	Value.	Cost of cultivation.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs.	Rs. a.	Rs. a.
I { Wheat ...	408	642	570	1,175	28	5 10	22 6
I { Gram ...	722	781					
II { Wheat ...	405	560	490	1,095	25	6 1	18 14
II { Gram ...	759	739					
III { Wheat ...	403	556	425	980	21	11 4	9 12
III { Gram ...	751	705					

SUBJECT.—To test the effect of different methods of tillage on rabi crops manured with cattle dung (20 lbs. nitrogen per acre) applied every second year. Plots to be ·10 acre each.

PLOT I.—Bakhared.

„ II.—Ploughed with country plough.

„ III.—Ploughed with Ransome's turn-wrest plough.

CROP.—Wheat and gram to be rotated.

No. of Plot.	Outturn in lbs. per acre.						
	Average for eight years.		For 1912-13.				
	Grain.	Straw.	Grain.	Straw.	Value.	Cost of cultivation.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs.	Rs. a.	Rs. a.
I { Wheat ...	410	597	465	1,120	24	5 10	18 6
I { Gram ...	714	739					
II { Wheat ...	381	551	460	1,065	22	6 1	15 15
II { Gram ...	711	739					
III { Wheat ...	417	524	350	700	17	11 4	5 12
III { Gram ...	741	819					

Bakharing has in both series proved to be more profitable than ploughing in the year under report.

SUBJECT.—To test the effect of san hemp as green manure ploughed in at different times for irrigated wheat. Plots to be ·25 acre each.

Plot I—San hemp ploughed in as green manure in middle of August.

„ II—San hemp ploughed in as green manure at the end of August.

„ III—Unmanured.

No. of plot.	Outturn per acre in lbs.			
	Grain.	Straw.	Value.	Increase in value due to green manure.
1	2	3	4	5
	lbs.	lbs.	Rs. a. p.	Rs. a. p.
I	970	930	43 0 0	9 0 0
II	850	840	37 8 0	3 8 0
III	770	820	34 0 0	...
	Duplicate.			
I	790	840	35 8 0	2 8 0
II	770	770	34 0 0	1 0 0
III	760	720	33 0 0	...

In both series the green manure ploughed in the middle of August gave the best account of itself. The plots were irrigated twice, once before sowing wheat to stimulate the decomposition of the green manure, and once after sowing to supply moisture to the growing crop.

SUBJECT.—To test the manurial value of calcium nitrate for irrigated wheat :—

Plot I—Calcium nitrate, 30 lbs. nitrogen, per acre.

„ II—Unmanured.

„ III—Calcium nitrate 30 lbs. nitrogen. per acre.

„ IV—Unmanured.

„ V—Calcium nitrate 15 lbs. nitrogen, per acre.

„ VI—Unmanured.

„ VII—Calcium nitrate 15 lbs. nitrogen, per acre.

„ VIII—Unmanured.

No. of Plot.	Outturn in lbs. per acre.							
	Average for 3 years.			For 1912-13.			Increase in value due to manure.	Cost of manure.	Loss due to manure.
	Grain.	Straw.	Value.	Grain.	Straw.	Value.			
1	2	3	4	5	6	7	8	9	10
	lbs.	lbs.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ..	833	890	37 0 0	640	690	28 7 0	7 0 0	21 9 0	14 9 0
II ...	613	687	27 6 0	480	550	21 8 0			
III ...	903	997	40 4 0	780	900	34 15 0	11 12 0	21 9 0	9 13 0
IV ..	643	687	28 9 0	520	580	23 3 0			
V ...	777	797	34 6 0	540	560	23 15 0	2 15 0	10 12 0	7 14 0
VI ...	590	640	26 4 0	470	530	21 0 0			
VII ...	817	917	36 8 0	610	700	27 5 0	7 14 0	10 12 0	2 14 0
VIII ...	597	683	26 11 0	430	520	19 6 0			

In every case calcium nitrate has accounted for a fairly large increase in the outturn, but till that increase covers the cost of the artificial manure leaving a margin of profit it is useless to think of getting cultivators to use it.

SUBJECT.—To test the manurial value of calcium cyanamide for irrigated wheat:—

PLOT I.—Calcium cyanamide 30 lbs. nitrogen per acre.

" II.—Unmanured.

" III.—Calcium cyanamide 30 lbs. nitrogen per acre.

" IV.—Unmanured.

" V.—Calcium cyanamide 15 lbs. nitrogen per acre.

" VI.—Unmanured.

" VII.—Calcium cyanamide 15 lbs. nitrogen per acre.

" VIII.—Unmanured.

No. of Plot.	Outturn in lbs. per acre.								
	Average for 3 years.			For 1912-13.			Increase in value due to manure.	Cost of manure.	Loss due to manure.
	Grain.	Straw.	Value.	Grain.	Straw.	Value.			
1	2	3	4	5	6	7	8	9	10
	lb.	lb.	Rs. a. p.	lb.	lb.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	693	800	31 1 0	630	870	28 13 0	3 2 0	24 0 0	20 14 0
II ...	593	643	26 6 0	570	700	25 11 0			
III ...	733	777	32 9 0	640	690	28 7 0	1 15 0	24 0 0	22 1 0
IV ...	610	676	27 3 0	590	700	26 8 0			
V ...	673	750	30 1 0	630	780	28 7 0	6 11 0	12 0 0	5 4 0
VI ...	597	610	26 7 0	490	510	21 12 0			
VII ...	727	803	32 7 0	650	800	29 5 0	2 8 0	12 0 0	9 8 0
VIII ...	657	757	29 7 0	580	870	26 13 0			

The same remarks apply here as have been made regarding calcium nitrate. But while the average increase over a period of three years has amounted to 222 lbs. of grain per acre for the series to which calcium nitrate is applied, for the calcium cyanamide series the average increase has been only 92 lbs. Calcium nitrate would thus appear to be much the better of the two manures for this particular soil.

SUBJECT.—To ascertain the effect of irrigation on the second crop sown after rice as utera and by drill in *matasi* soil. Plots to be manured annually with cattle dung (40 lbs. nitrogen per acre.)

PLOT. I.—Rice to be followed by linseed sown by drill after rice is reaped.

" II.—Rice to be followed by linseed sown broadcast before rice is reaped.

" III and IV.—To be followed by teora instead of linseed.

" V and VI.—To be followed by urid instead of linseed.

" VII and VIII.—To be followed by gram instead of linseed.

No. of Plots.	Outturn per acre.											
	Average for 5 years.		For 1912-13.		Value of outturn.				Cost of cultivation.			
	Grain.	Straw.	Grain.	Straw.								
1	2	3	4	5	6				7			
	lbs.	lbs.	lbs.	lbs.	Rs.	a.	p.	Rs.	Rs.	a.	p.	
I Paddy	816	860	960	1,100	28	0	0	29	12	8	0	
I Linseed	7	8	15	40	1	0	0					
II Paddy	842	892	980	1,080	28	0	0	30	6	11	0	
II Linseed	33	64	25	80	2	0	0					
III Paddy	728	806	960	1,070	28	0	0	35	12	8	0	
III Teora	55	119	180	290	7	0	0					
IV Paddy	998	962	1,050	930	29	0	0	33	6	11	0	
IV Teora	128	224	110	190	4	0	0					
V Paddy	782	780	930	920	26	0	0	33	12	8	0	
V Urid	62	108	170	310	7	0	0					
VI Paddy	900	930	1,220	1,170	34	0	0	37	6	11	0	
VI Urid	90	182	70	180	3	0	0					
VII Paddy	676	706	810	940	23	0	0	30	12	8	0	
VII Gram	174	230	230	410	7	0	0					
VIII Paddy	788	848	1,110	1,090	31	0	0	39	6	11	0	
VIII Gram	142	164	280	330	8	0	0					

In the corresponding unirrigated series the attempt to grow a second crop has practically ended in failure owing to the nature of the somewhat inferior *dorsa* soil in which the experiment has been carried out: the experiment will therefore be given up. In the irrigated series the second crop has done better on the whole when broadcasted than when sown by the drill; the cost of cultivation is also less in the former case.

SUBJECT.—To ascertain the effect of irrigation on second crop sown as *utera* and by drill in *dorsa* soil. Plots to be manured annually with cattle dung (40 lbs. nitrogen per acre):—

PLOT. I.—Rice to be followed by linseed sown by drill after rice is reaped.

" II.—Rice to be followed by linseed sown broadcast before rice is reaped.

" III and IV.—To be followed by teora instead of linseed.

" V and VI.—To be followed by urid instead of linseed.

" VII and VIII.—To be followed by gram instead of linseed.

No. of Plots.	Outturn per acre.											
	Average for 5 years.		For 1912-13.		Value of outturn.				Cost of cultivation.			
	Grain.	Straw.	Grain.	Straw.								
1	2	3	4	5	6				7			
	lbs.	lbs.	lbs.	lbs.	Rs.	a.	p.	Rs.	Rs.	a.	p.	
I Paddy	770	834	680	650	19	0	0	21	12	8	0	
I Linseed	16	36	20	80	2	0	0					
II Paddy	572	578	670	620	19	0	0	21	6	11	0	
II Linseed	53	112	25	110	2	0	0					
III Paddy	479	643	480	570	14	0	0	19	12	8	0	
III Teora	37	91	120	240	5	0	0					
IV Paddy	426	435	430	500	12	0	0	17	6	11	0	
IV Teora	152	300	130	230	5	0	0					
V Paddy	318	399	410	480	12	0	0	19	12	8	0	
V Urid	68	122	180	230	7	0	0					
VI Paddy	481	479	480	510	14	0	0	18	6	11	0	
VI Urid	104	192	90	130	4	0	0					
VII Paddy	418	536	560	490	16	0	0	21	12	8	0	
VII Gram	166	176	180	160	5	0	0					
VIII Paddy	677	705	690	690	20	0	0	28	6	11	0	
VIII Gram	172	204	280	330	8	0	0					

SUBJECT.—To ascertain the outturn of different varieties of groundnut followed by wheat grown as a second crop under irrigation. Plots to be ·10 acre. Manured with poudrette (40 lb. nitrogen per acre annually):—

No. of Plot.	Outturn per acre in lbs.					Value of both crops.
	Average of 4 years.		For 1912-13.			
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	
1	2	3	4	5	6	7
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
Virginia ...	567	...	840	...	60 0 0	96 15 0
Wheat ...	720	910	820	1,000	36 15 0	
Big Japanese ...	475	...	880	...	62 13 0	101 13 0
Wheat ..	635	950	840	1,300	39 0 0	
Pondicherry ...	960	...	920	...	65 11 0	96 14 0
Wheat ...	612	802	680	960	31 3 0	
Madras ...	1,165	...	860	...	61 7 0	83 15 0
Wheat ...	512	620	490	700	22 8 0	
Mozambique ...	875	...	780	...	55 12 0	101 9 0
Wheat ...	767	902	1,010	1,320	45 14 0	
Local ...	1,507	..	1,200	...	85 11 0	127 5 0
Wheat ..	652	832	910	1,260	41 10 0	

The practicability of growing wheat as a second crop after groundnut has been definitely proved by this experiment. The local variety of groundnut is the heaviest yielder under trial.

SUBJECT.—To ascertain the relative values of outturns of different varieties of irrigated wheats grown on unmanured land:—

Name of variety.	Outturn per acre in lbs.		Valuation by Ralli Bros. per cwt.	Value of each variety per acre.
	Grain.	Straw.		
1	2	3	4	5
	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1. Nagpur Hawra ...	520	500	5 3 0	26 0 0
2. Pusa No. 4 ...	740	620	5 9 0	40 0 0
3. Pusa No. 6-A ...	660	580	5 6 0	34 0 0
4. Pusa No. 7 ...	920	960	5 3 0	47 0 0
5. Poona-Nagpur-Muzzaffarnagar ..	680	700	5 8 0	36 0 0
6. Poona Hansia of Broach ...	560	640	4 12 0	22 0 0
7. Pusa No. 8 ...	560	520	5 7 6	29 0 0
8. Raipur red Pissi ..	800	780	5 5 0	41 0 0
9. Hoshangabad white Pissi ..	680	740	5 7 0	36 0 0
10. Hoshangabad mundi Pissi ...	740	780	5 8 0	39 0 0
11. Raipur Kathia ..	900	600	5 1 0	43 2 0
12. Pusa No. 108 ...	720	820	5 7 0	38 0 0
13. Pusa No. 107 ...	780	1,000	5 6 6	42 0 0
14. Pusa No. 12 ...	640	620	5 6 6	34 0 0

The plots of this series were irrigated once. Pusa No. 7 gave the highest outturn.

On the samples of Pusa wheats grown on the Raipur Farm in 1911 and sent by the Imperial Economic Botanist to Mr. A. E. Humphries, past President of the National Association of British and Irish Millers, the following report was received:—

> "The Raipur unirrigated lot is truly superb in appearance; indeed I do not think I am exaggerating if I say it is the finest looking lot of Indian wheats I have ever seen. The Raipur irrigated lot is distinctly inferior to it in appearance but is nevertheless a very beautiful sample. The lot from Pusa suffers by the comparison. In view, and general appearance of crust and crumb, the Raipur lots are of the very highest class, but on the one point of strength they are really good without being extraordinary, judged by the standard of typical London flour. A miller buying wheats for the first time on appearance only would unhesitatingly place the Raipur unirrigated lot at the head of the entire lot I have received this season."

SUBJECT.—To ascertain the relative values of different varieties of irrigated wheats grown on manured land. Sixteen cart-loads of poudrette manure to be applied annually.

Name of variety.	Outturn per acre in lbs.		Valuation by Ralli Bros.	Value of each variety per acre.
	Grain.	Straw.		
1	2	3	4	5
	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1. Nagpur Hawra ...	900	960	5 3 0	46 0 0
2. Pusa No. 4 ...	660	660	5 9 0	36 0 0
3. Pusa No. 6-A ...	460	740	5 6 0	25 0 0
4. Pusa No. 7 ...	1,240	1,380	5 3 0	63 0 0
5. Poona-Nagpur-Muzaffarnagar ...	780	840	5 8 0	41 8 0
6. Poona Hansia of Broach ...	900	960	4 12 0	42 0 0
7. Pusa No. 8 ...	660	620	5 7 0	32 0 0
8. Raipur red pissi ...	940	1,080	5 5 0	49 8 0
9. Hoshangabad white pissi ...	1,040	1,300	5 7 0	55 0 0
10. Hoshangabad mundi pissi ...	920	1,060	5 8 0	49 0 0
11. Raipur Kathia ...	940	1,100	5 1 0	47 0 0
12. Pusa No. 108 ...	860	840	5 7 0	45 8 0
13. Pusa No. 107 ...	920	1,200	5 6 0	49 0 0
14. Pusa No. 12 ...	640	800	5 6 0	34 0 0

These plots were irrigated once. Pusa No. 7 gave the highest yield in this series; Hoshangabad white pissi comes next.

Varieties of Crops.

Clover was sown as a second crop after rice and gave one cutting: for want of irrigation no subsequent cuttings were obtained.

Soybean gave an outturn of 384 lbs. per acre.

Buri cotton yielded 240 lbs. of kapas per acre.

Fruit Garden.—Guavas were in full bearing in the cold weather. Mangoes and Sapotas are fruiting this season.

Statement showing the receipts and expenditure for 1912-13.

Head of receipts.	Average of previous 5 years.	Receipt for the year 1911-12.	1912-13.			Total.
			Value of seed supplied free.	Value of seed supplied on loan.	Actual amount credited in treasury.	
1	2	3	4	5	6	7
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Sale-proceeds of farm produce.	6,940 10 10	4,478 3 3	230 3 0	..	5,284 4 11	5,514 7 11
Other receipts ...	1,416 12 0	...	...	..	...	...
Receipts of Navegaon Reserve.	...	2,094 2 0	...	...	1,047 9 0	1,047 9 0
Total ...	8,357 6 10	6,572 5 3	230 3 0	...	6,331 13 11	6,562 0 11

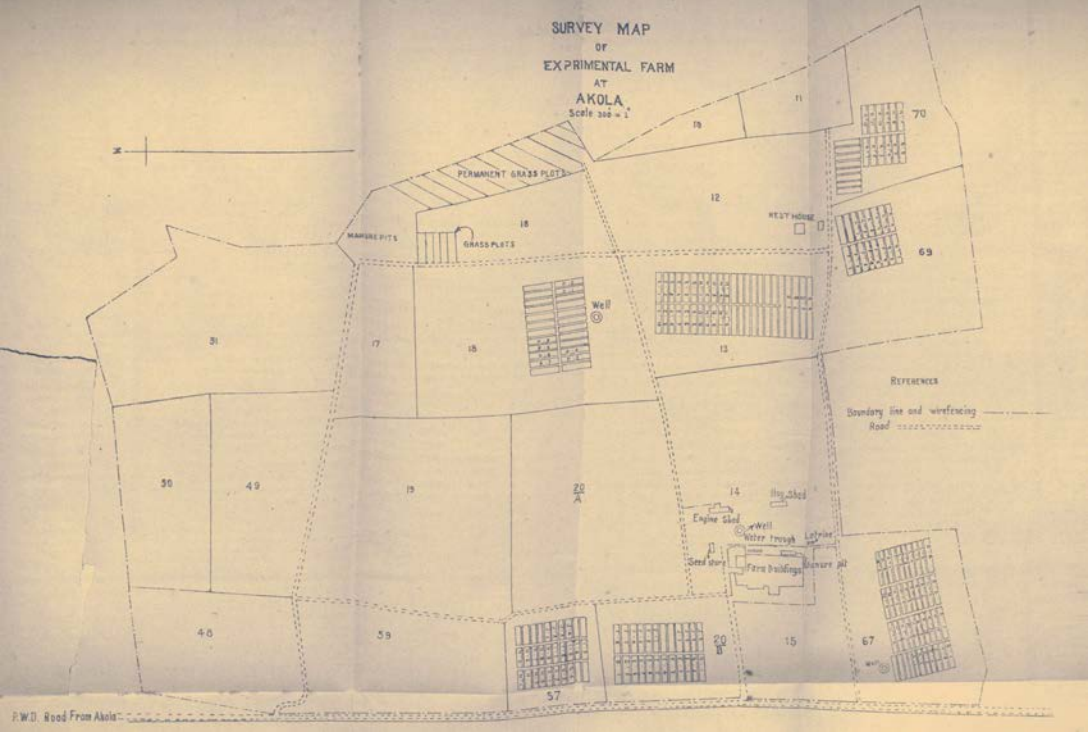
Expenditure.

Expenditure.	Average of 5 years.	Actual for 1911-12.	Actual for 1912-13.
1	2	3	4
	Rs. a. p.	Rs. a. p.	Rs. a. p.
Establishment charges.			
Establishment pay	4,355 11 3	3,613 9 6	2,335 2 6
Travelling allowance	181 2 11	183 5 0	168 2 6
Total ...	4,536 14 2	3,796 14 6	2,503 5 0
Supplies and Services.			
Seed grain	138 10 6	117 12 9	21 8 0
Buildings and roads	578 9 11	...	49 10 0
Purchase of cattle and implements	183 4 2	90 14 4	950 8 0
Feed and care of cattle	818 9 7	871 15 3	861 14 9
Variable labour	2,232 1 9	3,842 8 9	4,196 9 0
Manure	359 7 3	310 7 1	300 5 9
Miscellaneous	2,439 2 11	1,116 7 11	1,285 7 5
Purchase of land	1,100 0 0	...	...
Purchase of materials for chain pumps	1,153 11 6	...	...
Purchase of books	...	...	145 13 0
Total ...	9,003 9 7	6,350 2 1	7,811 5 11
Contingencies.			
Postage charges	74 15 6	70 2 0	71 0 0
Telegram charges	6 0 1	0 7 0	1 11 6
Country Stationery	3 4 8	3 15 0	0 4 0
Conveyance of forms	...	...	1 8 0
Carriage of stationery	...	...	5 6 0
Total ...	84 4 3	74 8 0	79 13 6
	13,624 12 0	10,221 8 7	10,394 8 5

D. CLOUSTON.

SURVEY MAP
OF
EXPRIMENTAL FARM
AT
AKOLA.

Scale 200 = 1"



Report on the Akola Agricultural Station 1912-13.

Description.

This farm is on the Basim road four miles from Akola. It was opened in June 1906, and the experimental work was started the following year; the results of experiments for six years are now available. An area is being standardised with the view of completing the duplication of all the experimental series. In area the farm is 271 acres.

The soil is a deep black clayey loam typical of the cotton tract. It is subject to water-logging during periods of continuous rain, and cracks readily on the loss of moisture. The analysis is given below:—

	Per cent.
Insoluble silicates and sand	56·11
Peroxide of iron	9·83
Alumina	10·68
Lime	6·59
Magnesia	2·51
Potash	0·37
Soda	0·23
Phosphoric acid	0·08
Sulphuric acid	...
Carbonic acid	4·18
Organic matter and combined water	9·42
Total Nitrogen ...	0·03

The two staple crops grown on the farm are cotton and juar, and the experimental series therefore deal almost entirely with these. It has been conclusively proved that *rosea*, a type of *jari*, which gives from 39 to 40 per cent. of lint to seed, and approximately one-sixth more lint than that of any other cotton under trial, is by far the most profitable cotton for the soil and climate of this part of India. Its lint fetches the same price as that of the mixture known as *Berar jari*, while the *kapas* (unginned cotton) fetches from Rs. 3 to Rs. 4 more per khandi of 560 lbs. If we take the value of an acre of *Berar jari* this year as being Rs. 36 per acre, cultivators have, by growing *rosea* in place of *jari* made a clear profit of Rs. 6 per acre. On the farm the outturn of *rosea kapas* over an area of 165 acres was 489 lbs. *kapas* per acre, which on being ginned yielded 195·5 lbs. of lint. From the results obtained in Series E it has been conclusively proved that *Berar jari* grown under the same conditions would have yielded 164½ lbs. of lint only. A net gain of 31 lbs. of lint per acre worth Rs. 11-10-0 has therefore been gained by substituting *rosea* for *Berar jari* on this farm and the profits of the farm have been increased thereby to the extent of Rs. 1,918-2-0. Had the cultivators of Berar as a whole grown pure *rosea* their farming profits from cotton cultivators in this Division would have been increased this year by nearly two crores of rupees.

There were 90 cotton seed-farms in Berar in the year under report. Of these all grew *rosea*, while 40 grew *buri* also. The areas of these seed-farms ranged from 10 to 60 acres, They have produced about 389,058 lbs. of *rosea* and 11,739 lbs. of *buri* seed, which will be used for seed purposes. The demand on the Akola Farm for selected *rosea* seed last year for these seed-farms and from other cultivators was far in excess of the supply available despite the fact that four-fifths of the cropped area of the farm was sown with this variety and that 28·069 lbs. of seed was supplied to cotton growers. The farm seed was sold at 2½ times the bazar rate. The selected strain now being propagated gave this year 80,678 lbs. of *kapas* over an area of 165 acres which on ginning gave 40 per cent. of lint to seed. This outturn is more than double the average for the district.

Plant-to-plant selection is being continued with a view to prevent any deterioration in the percentage of lint. The only other short stapled cotton grown on the farm was *rosea cutchica* which on an area of 19 acres, gave 9,386 lbs. of kapas and the ginning percentage of lint to seed was 37 per cent. It is shorter in staple than *rosea* and is generally valued at half an anna less per pound.

The long and medium stapled cottons grown during the year on the farm were *buri, bani, cambodia, malvensis* and *vera*, With a short rainfall of 18·10 inches *buri* fared badly, and gave an outturn of only 7,009 lbs. of *kapas* over an area of 24·50 acres. This variety again suffered during September and October from red leaf-blight. Lines of *juar* grown as a windbreak in one *buri* field had an appreciable effect in checking the damage done by this blight, which would seem to indicate that it is caused by the dry hot winds at the end of rains.

Plant-to-plant selection of *buri* and *bani* is being continued with a hope that in the near future, the price of these long stapled varieties may rise. At present there is no demand whatever for the seed of the latter.

Of the selected *juars* under trial *Saoner* and *Ramkel* again gave comparatively high yields of grain and fodder. For *chapti*, which had done well in previous years, the rainfall of the season under report was too low, the variety being a distinctly late one. 4,900 lbs. of selected *juars* have been distributed for sowing this season.

The year on the whole has been rather unfavourable for the Berar cultivator. His outturn of cotton was less than that of last year by about a fourth; while his *juar* crop compares still less favourably with that of last year.

The demand for agricultural implements was good. 137 turn-wrest ploughs, 70 fodder cutters, 5 oil engines, 4 gins and 100 hoes were sold during the year. Owing to the scarcity of fodder, the department, on the timely advice of the Commissioner of Berar, ordered a large supply of fodder-cutters and was thus in a position to meet the greatly increased demand for these machines.

The receipts for the year were Rs. 17,551-10-3, while the expenditure was Rs. 12,538-14-10, leaving a profit of Rs. 4,988-11-5, After paying all expenses, including the pay of the staff, the profits again far more than cover the cost of our whole agricultural establishment in this Division.

The farm was visited during the year by the Hon'ble the Chief Commissioner, the Commissioner of Berar and the Deputy Commissioners of Akola and Buldana, the Imperial Cotton Specialist and several other officials. On the occasion of the Divisional meeting of the Berar associations, held on the farm on the 14th November 1912, about 2,000 leading land holders in Berar, Wardha and Nimar were present. The total number of cultivators who came on business or to see the farm at other times of the year was 1,800. Mr. Bhayalal Dube was Superintendent of the farm till April, when he was promoted to the post of Divisional Superintendent of Agriculture for Berar. He has proved himself to be an excellent farm manager and very tactful in his dealings with cultivators. V. B. Dhamapurkar, Overseer of the farm, has been made Superintendent. He continues to improve in health and efficiency.

CHARACTER OF THE SEASON.

The following statement shows the rainfall of the year compared with the average for the last six years :—

Months.	No. of rainy days.	Rainfall.		Average of last six years.		Remarks.
		Inches.	Cents.	Inches.	Cents.	
1	2	3	4	5	6	7
June 1912 ... 1st half ...	1	..	15	1	73	
2nd „ ...	5	4	53	4	16	
July 1912 ... 1st half ...	3	...	52	3	93	
2nd „ ...	10	5	13	3	46	
August 1912 ... 1st half ...	7	3	35	5	10	
2nd „ ...	3	2	27	2	46	
September 1912. 1st half ...	1	...	12	2	08	
2nd „ ...	1	1	27	2	06	
October 1912 ... 1st half ...	1	...	23	...	28	
2nd „ ...	..	...	...	...	...	
November 1912. 1st half ...	...	...	...	...	15	
2nd „ ...	1	...	33	...	44	
December 1912.. 1st half ...	...	...	...	...	07	
2nd „ ...	...	...	...	...	84	
January 1913 ... 1st half ...	...	...	...	...	35	
2nd „ ...	...	...	...	...	...	
February 1913 ... 1st half ...	...	...	...	...	...	
2nd „ ...	1	...	20	...	3	
March 1913 ... 1st half ...	...	...	...	...	...	
2nd „ ...	...	...	...	...	16	
April 1913 ... 1st half ...	...	...	...	...	...	
2nd „ ...	...	...	..	...	...	
May 1913 ... 1st half ...	...	...	...	...	12	
2nd „ ..	...	...	...	...	3	
Total ...	34	18	10	27	45	

N. B.—A rainy day is taken as one having 10 or more cents rainfall.

A light shower of 15 cents was obtained on the 15th of June: on the 19th of that month a fall of 4½ inches supplied the required moisture for sowing. The first half of July was almost rainless, a fall of 52 cents only being obtained. The young cotton plants remained small and even withered in places. They were revived by a fall of 5·13 inches in the last half of July. Many plants had died in the meantime with the result that the crop was very thin in places. On the farm an area of 70 acres sown before the rains suffered rather badly. A fall of 4·53 inches shortly after sowing levelled up the loose soil which on drying formed a crust, through which many of the young seedlings failed to find their way. Part of this area had therefore to be resown. Continuous rains in the second half of July and beginning of August interfered with weeding, and in some districts fields got so badly overgrown with weeds that the cotton plants were smothered. The monsoon practically ceased in September. This scanty rainfall combined with its early cessation was fatal to the success both of *buri* cotton and to the late *juar* under trial on the farm.

EXPERIMENTS.

SERIES A—SUBJECT.—Rotation experiments with *jari* cotton as the principal crop. The plots are manured with cattle-dung at the rate of 40 lbs. nitrogen per acre in the year in which cotton is grown, except in the case of plot IX. In plots III and IV there are six lines of cotton to 2 lines of tur Area of each plot ·10.

No. of plot.	Name of crop.	Average outturn per acre for six years.		Crops in 1912-13.	Outturn per acre in 1912-13.		Average value outturn for six years.	Average net profit per acre.	Remarks.
		Seed cotton or grain in lbs.	Fodder. in lbs.		Grain and seed cotton in lbs.	Fodder in lbs.			
1	2	3	4	5	6	7	8	9	10
							Rs. a. p.	Rs. a. p.	
I	Cotton ...	416	...	Wheat ...	30	123	37 5 3	25 6 9	
	Wheat ...	465	710	...	...	...	...	...	
II	Wheat ...	274	494	Cotton ...	549	...	34 0 4	22 1 10	
	Cotton ...	331	...	...	...	...	...	...	
III	Cotton ...	206	...	Juar ...	755	2,330	32 2 1	21 6 1	
	Tur ...	185	250	...	..	..	...	...	
	Juar ...	480	1,643	...	...	...	...	...	
IV	Juar ...	538	2,052	Cotton ...	108	...	30 4 8	19 0 8	
	Tur ...	219	219	Tuar ...	266	325	...	...	
	Cotton ...	112	...	...	..	...	...	...	
V	Cotton ...	409	...	Grain ...	471	729	37 3 3	26 10 9	
	Gram ...	452	682	...	...	...	...	...	
VI	Gram ..	349	432	Cotton ...	612	...	39 3 8	28 11 2	
	Cotton ...	421	...	...	...	...	...	...	
VII	Cotton ...	508	...	Tur ...	541	880	42 13 3	32 3 1	
	Tur ...	469	466	...	...	...	...	...	
VIII	Tur ...	410	545	Cotton ...	707	...	43 2 3	32 8 1	
	Cotton ...	448	...	...	...	...	...	...	
IX	Cotton ...	387	...	Cotton ...	417	...	48 12 6	37 15 6	

Cotton grown continuously on the same land for the last six years has given the highest nett profit and no bad effects are yet apparent. Wheat and juar were comparative failures this year owing to drought.

TILLAGE EXPERIMENT.

SERIES B—SUBJECT.—Rosea cotton and wheat are grown in rotation and the plots are manured as in Series A.

I.—Bakhared every year in April.

II.—Ploughed with native plough and bakhared in April.

III.—Ploughed with turn-wrest plough and bakhared in April.

IV.—Ploughed with turn-wrest plough every third year in April and bakhared in other years.

Each plot measuring ·20 of an acre.

No. of plot.	Average outturn of wheat per acre for three years—1907-08 1909-10 and 1911-12.		Average outturn of cotton for three years—1908-09, 1910-11, and 1912-13 in lbs.	Outturn of cotton per acre for 1912-13.
	Grain.	Fodder.		
1	2	3	4	5
	lbs.	lbs.	lbs.	lbs.
I	413	647	589	661
II	515	682	563	676
III	528	781	556	673
IV	449	756	566	647

DUPLICATE.

No. of plot.	Outturn of cotton per acre for 1912-13 in lbs.	Outturn of wheat per acre for 1912-13 in lbs.	
		Grain.	Fodder.
1	2	3	4
I	431	428	808
II	416	454	858
III	385	490	861
IV	386	461	872

The plots ploughed every year in the hot weather have given slightly higher yields of wheat than the corresponding *bakhared* plot. Ploughing in the hot weather has on the other hand not increased the outturn of cotton: there would appear to be no advantage gained by ploughing for cotton except when the land is foul with weeds.

SERIES C—SUBJECT.—Spacing of cotton plants. The seed is dibbled and the plots manured as series A. *Rosea* cotton is grown continuously.

Area of each plot ·10 acre per plot.

No. of plot.	Spacing distance between		Average outturn of kapas per acre in lbs. for five years—1907-08 to 1911-12.	Outturn of kapas per acre in lbs in 1912-13.
	Rows.	Plants in rows.		
1	2	3	4	5
	Inches.	Inches.		
I	15	7	497	652
II	15	15	461	674
III	20	15	463	698
IV	20	20	371	504
V	25	15	385	515
VI	Unthinned.		585 for 1911-12 only.	316

DUPLICATE.

No. of plot.	Showing distance between		Average outturn of kapas in lbs. per acre for three years—1909-10 to 1911-12.	Outturn of kapas in lbs. per acre in 1912-13.
	Rows.	Plants in rows.		
1	2	3	4	5
	Inches.	Inches.		
I	15	7	464	519
II	15	15	462	679
III	20	15	384	644
IV	20	20	374	609
V	25	15	389	661
VI	Unthinned.		596 for 1911-12 only.	465

Till the present year a spacing distance of 15″ × 7″ had for *jari* cotton always given the highest outturn. In the year under report a spacing distance of 20″ × 15″ in one series and of 15″ × 15″ in the other, have given the highest yields. The cause of this is probably to be found in the fact that owing to the short rainfall and to the greater supply of moisture required by a closer stand of plants, the crop suffered. The unthinned plot was much wilted by the heat of October.

SERIES D—SUBJECT.—To ascertain the comparative advantages of topping plants, the plants being topped when about 1 foot high. Rosea cotton is grown continuously. The plots are manured as in series A.

Area of each plot is ·10 of an acre.

Plot Treatment.

I ... ... Topped

II ... ... Not topped.

No. of plot.	Average outturn of kapas in lbs. per acre for 5 years from 1907-08 to 1911-12.	Outturn of kapas in lbs. per acre in 1912-13.
1	2	3
I	470	696
II	514	739

DUPLICATE.

No. of plot.	Average outturn of kapas in lbs. per acre for five years from 1908-09 to 1912-13.	Outturn of kapas in lbs. per acre in 1912-13.
1	2	3
I	317	453
II	360	481

Topping has again reduced the yield in this experiment. It retards the maturing of a crop without giving the *jari* plant the branching habit to any great extent.

SERIES E—SUBJECT.—To ascertain the relative values of the outturns of different cottons. The plots are manured as in series A.

Area of each plot ·10 acre.

No. of plot.	Variety.	Average outturn of kapas per acre in lbs. during the last five years (1907-08 to 1911-12)	Outturn of kapas in lbs. per acre in 1912-13.	Yield of lint in lbs. per acre for 1912-13.	Value of outturn in lbs. per acre in 1912-13. Based on Nagpur prices.	Remarks.
1	2	3	4	5	6	7
					Rs. a. p.	
I	Gossypium neglectum malvensis ...	412	583	192·39	67 13 5	
II	Do. do. vera ...	391	550	191·4	81 1 4	
III	Do. do. rosea ...	467	713	288·76	119 6 7	
IV	Do. rosea cutchica ...	484	642	227·54	92 11 9	
V	Berar jari ...	433	685	243·17	101 4 3	
VI	Saugor jari ...	518	479	143·7	62 8 5	Grown since 1911.
VII	Bani ...	330	561	153·15	68 7 10	
VIII	Buri ...	328	413	132·57	82 1 9	

The significant fact brought out by these results is that rosea has given a net profit of Rs. 18 per acre more than the ordinary mixed Berar jari which is grown in these Provinces at present.

SERIES G—SUBJECT.—To ascertain the relative values of cattle-dung, saltpetre and poudrette, as manures for cotton and juar grown in rotation. The manure is applied in the year in which cotton is grown.

Area of each plot ·10 of an acre.

Plot.	Treatment.
I	64 maunds of cattle-dung per acre.
II	*Nil.*
III	64 maunds of poudrette.
IV	2 maunds of saltpetre.

No. of plot.	Average outturn per acre of juar for two years (1908-09 to 1910-11.)		Average outturn of kapas per acre for three years—1907-08, 1909-10 and 1911-12.	Outturn of juar per acre for 1912-13.		Net profit per acre in 1911-12 due to manure.	Remarks.
	Grain	Fodder.		Grain.	Fodder.		
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	
I	534	1,855	308	464	5,110	34 1 5	
II	471	1,585	238	379	2,030	*Nil.*	
III	554	1,895	372	596	2,680	15 4 8	
IV	639	1,885	307	456	2,960	12 4 1	

The plots were not manured in the year under report. The increased outturns of plots 3 and 4 are therefore to be ascribed to the residues of the manures applied in previous years. Cattle-dung would seem to be more lasting in its effect as a manure than poudrette. It gave a much more bulky crop of fodder in plot 1 than poudrette in plot 3. The crop grown after poudrette on the other hand though more stunted gave larger heads and more grain. The effect of saltpetre in the second year after application though not so great as that of the other two is considerable. After applying manure for three years, the residues have accounted for a profit of about Rs. 34 in plot 1, of over Rs 15 in plot 3, and of over Rs. 12 in plot 4. The cost of manures applied in three years has been Rs. 15, Rs. 15 and Rs 40-10-0, respectively. It is worthy of note that the productive value of the residues on plot 3 has in one year covered the cost of the manures applied. This bears out what has been said in previous reports, *viz.*, that the ordinary cultivator's farming profit could be very largely increased if it were possible to induce him to apply larger quantities of locally available manures at the prices at which they are sold. At present, the best cultivators hesitate to pay Re. 1 per cart-load for cattle-dung, while very few of them are prepared to take poudrette at any price.

SERIES H—SUBJECT.—To ascertain the profit to be derived from the use of fertilisers as manures for cotton grown on black cotton soil. The superphosphate, sulphate of potash and sulphate of ammonia are drilled in at the time of sowing at the rate of 40 lbs. phosphoric acid, 35 lbs. of potash and 20 lbs. nitrogen per acre, respectively. The nitrate of soda is applied as a top-dressing at the rate of 20 lbs. nitrogen per acre.

Area of each plot is ·1C of an acre.

No. of plot.	Manure.	Average outturn of kapas in lbs. for five years (1907-08 to 1911-12.)	Average increase due to manure.	Outturn In 1912-13.	Remarks.
1	2	3	4	5	6
		lbs.	lbs.	lbs.	
I	Nitrate of soda, superphosphate and sulphate of potash.	515	217	851	
II	Nitrate of soda and superphosphate ...	535	237	821	
III	Nitrate of soda and potassium sulphate ...	403	105	695	
IV	Nitrate of soda ...	396	98	613	
V	Sulphate of ammonia ...	396	98	643	
VI	No manure ...	298	...	612	
VII	Superphosphate and sulphate of potash ...	379	81	601	
VIII	Superphosphate ...	392	94	653	
IX	Sulphate of potash ...	362	64	702	

DUPLICATE.

No. of plot.	Manures.	Average outturn of kapas per acre for two years (1910-11 and 1912-13.)	Outturn of kapas per acre for 1912-13.	Remarks.
1	2	3	4	5
		lbs.	lbs.	
I	Nitrate of soda, superphosphate and potassium sulphate.	546	683	
II	Nitrate of soda and superphosphate.	588	794	
III	Nitrate of soda and potash ...	455	741	
IV	Nitrate of soda ...	439	568	
V	Ammonium sulphate ...	392	604	
VI	No manure ...	388	580	
VII	Calcium nitrate ..	483	593	
VIII	Superphosphate and sulphate of potash.	464	637	
IX	Superphosphate ...	476	689	
X	Sulphate of potash ...	410	686	

No deductions of any value can be made from the results obtained in these series in the year under report. The nitrates were applied on the 10th of August, the rainfall after that date amounted to 2·27 inches only, which was probably insufficient to carry down the bulk of the dissolved manure to the zone commanded by the feeding roots of the plant.

SERIES I—SUBJECT.—To test the manurial value of a dressing of cattle-dung followed by a top-dressing of nitrate of soda or saltpetre after the plants have been thinned out. Cotton is grown continuously.

Area of each plot ·10 of an acre.

I—Cattle-dung 64 maunds plus 10 lbs. of nitrogen as nitrate of soda,

II—Cattle-dung 32 maunds plus 20 lbs. nitrogen as nitrate of soda.

III—No manure.

IV—Cattle-dung 64 maunds plus 10 lbs. nitrogen as saltpetre.

V—Cattle-dung 32 maunds plus 20 lbs. nitrogen as saltpetre.

No. of plot.	Average outturn of cotton per acre for five years (1907-08 to 1911-12).	Outturn of cotton per acre in 1912-13.	Value of produce	Cost of manure.	Net profit due to manure.	Remarks.
1	2	3	4	5	6	7
	lbs.	lbs.	Rs. a. p.	Rs. a p.	Rs. a. p.	
I	602	801	120 2 5	12 3 6	22 9 4	
II	549	762	114 4 10	17 9 0	11 6 3	
III	293	569	85 5 7	*Nil.*	...	
IV	575	889	133 5 9	11 9 2	36 7 0	
V	490	898	134 11 3	15 10 4	33 11 4	

The application of cattle-dung followed by that of nitrate of soda in the one case and saltpetre in the other has added very largely to the cultivation profits. Saltpetre has given a better account of itself than nitrate of soda and the larger quantity of cattle-dung followed by a smaller dressing of the fertilizer has given the largest profits.

SERIES J—SUBJECT.—To determine the comparative value of cattle-dung and urine as manures for cotton. The urine being conserved by the dry earth system. Cotton and juar are grown in rotation and the manure is applied every year.

Area of each plot ·10 of an acre.

Plot I—Dung and urine of two cattle for 30 days.

„ II—Dung alone of two cattle for 30 days.

„ III—No manure.

„ IV—Urine alone of two cattle for 30 days.

No. of plot.	Average outturn of juar for two years —1908 to 1910.		Average outturn of kapas per acre for three years.	Outturn of juar per acre, 1912-13.		Value of produce.	Cost of manure.	Cost of profit due to manure.
	Grain.	Fodder.		Grain.	Fodder.			
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
II ...	906	4,275	592	861	3,150	66 6 0	7 8 0	16 1 11
III ..	756	2,790	434	795	2,490	58 0 5	5 0 0	9 4 4
IV ...	484	1,960	290	569	2,005	43 12 1	...	...
	728	2,955	450	780	2,470	57 3 2	2 8 0	10 15 1

DUPLICATE.

No. of plot.	Outturn of kapas per acre for 1910-11.	Outturn of juar for 1911-12.		Outturn of kapas per acre for 1912-13	Value of produce.	Cost of manure.	Profit due to manure.	Remarks.
		Grain.	Fodder.					
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
I ...	255	780	4,230	650	97 8 0	7 8 0	34 8 0	
II ...	223	630	2,830	546	81 14 5	5 0 0	21 6 5	
III	184	439	2,360	370	55 8 0	*Nil.*	...	
IV	206	592	3,510	524	78 9 7	2 8 0	20 9 7	

These results corroborate the findings of previous years. The manurial value of an animal's urine for cotton and juar is equal to that of its dung for the same period. The urine was collected by the dry-earth system.

SERIES K—SUBJECT.—To compare the outturn of local and other juars.

No. of plot.	Name of juar.	Average outturn for two years—1909-10 to 1911-12.		Outturn in 1912-13.	
		Grain.	Fodder.	Grain.	Fodder.
1	2	3	4	5	6
		lbs.	lbs.	lbs.	lbs.
I	Saoner ..	861	3,227	615	1,435
II	Chapti ...	845	3,446	390	965
III	Ramkel-Sanglud ...	823	2,828	368	835
IV	Hauri ...	745 for 1911-12 only	3,470	470	1,120
V	Lamkansi ...	650	2,120	363	1,275
VI	Natora ...	...	...	226	1,195
VII	Dukria ...	579	214	300	945
VIII	Amner ...	477	1,975	313	615
IX	Perio ...	506	2,548	180	842

Saoner, Ramkel and *Hauri* have again given comparatively high yields. *Juar* all over Berar was a poor crop as a whole owing to the short rainfall. *Chapti*, a Bombay variety which has always done well in years of good rainfall, suffered more than any other variety, being very late in maturing. Saoner would appear to be the best all round *juar* for the soil and climatic conditions which obtain in Berar.

SERIES M—SUBJECT.—To determine whether it is profitable to sow juar and cotton before the rains. These crops are grown in rotation. The plots are manured as in series A.

Area of the plots is ·10 of an acre.

No. of plot.	Crop.	Average outturn of kapas per acre for 1909-10 to 1910-11 and 1911-12.	Average outturn of juar per acre for 1909-10, 1910-11 and 1911-12.		Outturn of kapas for 1912-13.	Outturn of juar per acre for 1912-13.		Remarks.
			Grain.	Fodder.		Grain.	Fodder.	
1	2	3	4	5	6	7	8	9
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
I	Cotton sown before the rains.	477	...	...	397	...	...	
II	Cotton sown after rains break (at usual time).	434	...	...	397	...	...	
III	Juar sown before rains ...	...	707	2,408	..	510	2,060	
IV	Juar sown after rains break (at usual time).	...	680	2,477	...	610	2,145	

The pre-monsoon sowing of cotton did not do well this year owing to the erratic nature of the early rains. Juar grown before the rains was again severely damaged by stem borer, and the yield was thereby reduced.

SERIES N.—SUBJECT.—To test the value of gram as a soil renovator when grown along with cotton, the gram being sown between the rows of cotton after the last weeding of the latter.

Plot.			Treatment.
I	...	...	Cotton with gram.
II	...	...	Cotton without gram.

No. of plot.	Crop.	Average outturn of kapas in lbs. per acre for 1908-09 to 1911-12.	Outturn of kapas and grain in lbs. per acre in 1912-13.			Remarks.
			Kapas per acre.	Gram per acre.		
				Grain.	Fodder.	
1	2	3	4	5	6	7
		lbs.	lbs.	lbs.	lbs.	
I	Cotton with gram ...	390	575	*Nil.*	*Nil.*	
	„ without gram ...	365	570	...		

This experiment is not likely to give result of any practical value though it may be of considerable scientific interest. The gram this year almost failed owing to lack of moisture. The cotton-gram plot has given an average increase of 25 lbs. of kapas per acre.

SERIES P—SUBJECT—To ascertain the effect of irrigation on cotton. The plots are manured as in series A.

Area of each plot ·10 of an acre.

Plot I—Buri irrigated.

„ II— „ unirrigated.

„ III—Rosea irrigated.

„ IV—Rosea unirrigated.

Plot No.	Outturn of kapas pe acre in 1911-12.	Outturn of kapas per acre in 1912-13.	No. of waterings given.	Remarks.
1	2	3		5
	lbs.	lbs.		
... ...	167	338	4	
II	91	303	...	
III	614	721	4	
IV	484	364	...	

UNMANURED.

Plot No.	Outturn of kapas per acre in 1911-12.	Outturn of kapas per acre in 1912-13.	Number of waterings given.	Remarks.
1	2	3	4	5
	lbs.	lbs.		
I	115	190	4	
II	111	113	...	
III	329	308	4	
IV	241	244	...	

Irrigation has accounted for an increase in outturn; but the value of the increase falls far short of covering the cost of irrigation from wells. Irrigation gives additional pickings late in the season: the cotton at that time is of inferior quality being badly affected by boll-worms. Taking all things into consideration it is evident that it does not pay to irrigate cotton on black cotton soil.

GRASS PLOTS.

No. of plot.	Name.	Systematic name.	Average weight of hay per acre in two years—1910-11 and 1911-12.	Weight of hay per acre, 1912-13.	Value.
1	2	3	4	5	6
			lbs.	lbs.	
I	Lahani Marwel ...	Andropogan annulatus ...	4,572	3,125	...
II	Mothi Marwel ..	A. Caricosus ...	3,640	2,283	...
III	Kel ...	A. Pertusus ...	3,330	980	...
IV	Mushel ...	Iseilema laxum ...	2,736	1,400	...
V	Shera ...	Ischoemum laxum ...	2,766	1,260	...
VI	Pohnia ...	Ischoemum sulcatum ...	4,670	3,500	...

Kel being a late variety suffered owing to the early cessation of the rains this year.

VARIETIES OF CROPS.

SEED SELECTION AND PLANT BREEDING.

Cotton.—The system of plant-to-plant selection referred to in last year's report has been continued The whole area under *rosea* was sown with one strain, *viz.*, No. 1, the second picking of which gave 40·5 per cent of lint. The selected strain of *bani* now under cultivation gave 27·3, *rosea* cutchica 37 per cent, vera 34·8 per cent and *malvensis* No. 4 gave 33 per cent.

Cambodia was again tried and gave an outturn of only 100 lbs. per acre with a lint percentage of 29.

Allen's long staple yielded 106 lbs per acre. The crop was badly affected by red leaf blight. The percentage of lint to seed was 30.

Crosses.—Three promising cotton crosses have been selected for trial on a field scale next year. The outturn will be compared with that of *rosea*.

Appended to this report are the reports by the Director of the Imperial Institute and the Secretary of the British Cotton Growing Association on the samples of cotton sent to them for valuation. They show how little difference there is between the value of short-staple cotton and of long-staple cotton per pound. This bears out what has been said in previous reports, *viz.*, that the value of cotton to the grower depends very largely on the quantity of lint it yields per acre: quality is of very secondary importance.

The cross between *bani* and Deshi Lahore is of considerable promise: it is a good yielder, gives 35·1 per cent of lint to seed and the fibre is almost as good as that of the very best cotton grown in these Provinces, *viz.*, bani.

Soy bean was tried in an area of two acres but failed owing to the short rainfall. This crop is not suited for the cotton tract: its cultivation will therefore be discontinued.

Velvet beans gave an outturn of only 30 lbs. per acre. It, too, gives no promise of success.

Juars.—The plant-to-plant selection of juars was continued. Twenty-two varieties were under trial and yielded as below:—

Statement showing the yield of selected Juars per 100 *heads.*

Serial No.	Name of variety.	Weight of 100 heads in lbs.	Weight of grain in 100 heads.	Remarks.
1	2	3	4	5
		lbs. ozs.	lbs. ozs.	
1	Perio ...	19 10	15 13	
2	Kalbondi ...	22 7	16 0	
3	Lahi round ...	18 5	14 10	
4	Ramkel III ...	13 8	10 14	
5	Ramkel Sanglud ...	17 5	13 4	
6	Lahi, long ...	17 7	14 14	
7	Chapti ...	25 14	19 6	
8	Lamkansi ...	21 3	16 4	
9	Natora ...	19 4	14 14	
10	Amner ...	17 14	14 8	
11	Dukria ...	21 10	17 3	
12	Dhamna ...	23 3	18 14	
13	Saoner II ...	24 1	19 9	
14	Dabhadijad ...	24 12	19 9	
15	Khaparkhedi ...	15 13	14 4	
16	Andhali ...	17 0	12 6	
17	Dhula ...	18 2	13 12	
18	Barik Amner ...	27 10	20 13	
19	Garwa ...	19 14	14 12	
20	Jad Amner ...	17 0	14 7	
21	Alaspuri Motia ...	19 9	14 7	
22	Alaspuri Pivali ...	9 9	7 9	

Tobacco.—Two Pusa tobaccos, Nos. 28 and 32, were grown and gave yields of 928 lbs. and 2,479 lbs. of cured leaf per acre.

Egyptian clover (*berseem*) gave cuttings which weighed 8 706 tons per acre. It was fed to the farm cattle.

APPENDIX A.

IMPERIAL INSTITUTE.

RESULTS OF THE EXAMINATION OF COTTON FROM INDIA.

Imperial Institute No. 47314-1, *dated the* 14*th March* 1913.

Variety of cotton	...	*Rosea.*
Description	...	Unginned cotton.
Lint	...	Clean, rather coarse and harsh, of poor lustre, of pale cream colour and almost free from stains.
	...	Yield of lint on ginning, 38·7 per cent.
	...	Yield of lint per 100 seeds, 4·7 grams.
Seed		Small, and covered with a short brown or greenish brown fuzz.
Strength	...	Good.
Length of fibres	...	From 0·5 to 1·2 inch; mostly from 0·7 to 0·9 inch.
Commercial valuation	...	6*d* per lb. (nominal).
Remarks	...	These ten samples of cotton from Akola are all of good clean staple and represent a very satisfactory growth. At the present time cotton of this staple is of rather higher value than usual in comparison with the prices of other classes of cotton. On the date of the valuation of the present samples the following prices were quoted in the Liverpool market:—

"Middling"	... American	... 6·81*d.* per lb.	
"Fine"	... Broach	... 6$\frac{1}{2}$*d.*	„ „
"Fine"	... Bengals	... 5$\frac{1}{2}$*d.*	„ „

Variety of cotton	...	*Rosea cutchica.*
Description	...	Unginned cotton.
Lint	...	Clean, fairly fine, rather harsh, of moderate lustre, pale cream colour and almost free from stains.
	...	Yield of lint on ginning, 37·2 per cent.
	...	Yield of lint per 100 seeds, 4·4 grams.
Seed	...	Small and covered with a short brown or greenish brown fuzz.
Strength	...	Fairly good.
Length of fibres	...	From 0·5 to 1·1 inch; mostly from 0·7 to 0·9 inch.
Commercial valuation	...	5$\frac{3}{8}$*d* per lb. (nominal).
Remarks	...	As for Rosea.

Variety of cotton	...	*Vera.*
Description	...	Unginned cotton.

Lint	...	Clean, fairly fine, rather harsh, of moderate lustre, of pale cream colour, and free from stains.
	...	Yield of lint on ginning, 31·8 per cent.
	...	Yield of lint per 100 seeds, 3·1 grams.
Seed.	...	Small, and covered with short brownish fuzz.
Strength	...	Good.
Length of fibres	...	From 0·7 to 1·1 inch; mostly from 0·7 to 0·9 inch.
Commercial valuation	...	6⅛*d* per lb. (nominal).
Remarks	...	As for Rosea.

Variety of cotton	...	Malvensis.
Description	...	Unginned-cotton.
Lint	...	Clean, fairly fine and soft, of moderate lustre, of pale cream colour and practically free from stains.
	...	Yield of lint on ginning 29·0 per cent.
	...	Yield of lint per 100 seeds, 2·5 grams,
Seed	...	Small, and covered with short brownish fuzz.
Strength	...	Good.
Length of fibres	...	From 0·7 to 1·1; mostly from 0·7 to 0·9 inch.
Commercial valuation	...	6¼*d* per lb. (nominal).
Remarks	...	As for Rosea.

Variety of cotton	...	Buri No. 11.
Description	...	Unginned cotton.
Lint	...	Clean, fairly fine and soft, of moderate lustre, of pale cream colour and practically free from stains.
	...	Yield of lint on ginning, 31·7 per cent.
	...	Yield of lint per 100 seeds, 4·1 grams.
Seeds	...	Of medium size and covered with fairly long, white or greenish fuzz. A few clean or almost clean dark brown seeds were also present.
Strength	...	Rather irregular; on the whole fair.
Length of fibres	...	From 0·8 to 1·3 inch; mostly from 0·9 to 1·1 inch.
Commercial valuation	...	6½*d*. per lb. (nominal).

Variety of cotton	...	Buri No. 1
Description	...	Unginned cotton.
Lint	...	Clean, fairly fine, rather harsh, of fairly good lustre, of pale cream colour and almost free from stains.

	...	Yield of lint on ginning, 35·1 per cent
	...	Yield of lint per 100 seeds, 3·3 grams.
Seeds	...	Mostly small seeds covered with short greenish brown fuzz, together with medium sized seeds with fairly long white fuzz, and dark brown clean seeds; some undeveloped seeds and some attacked by insects were also present.
Strength	...	Rather irregular, on the whole good.
Length of fibres	...	From 0·6 to 1·1 inch, mostly from 0·7 to 0·9 inch.
Commercial valuation	...	6⅜*d* per lb. (nominal)

Variety of cotton	...	Saugor Jari.
Description	...	Unginned cotton.
Lint	...	Clean, fairly fine, rather harsh, of moderate lustre, of pale cream colour and almost free from stains.
	...	Yield of lint on ginning, 30·1 per cent.
	...	Yield of lint per 100 seeds, 2·25 grams.
Seeds	...	Small, and covered with short greenish or brownish fuzz.
Strength	..	Good.
Length of fibres	..	From 0·6 to 1·0 inch; mostly from 0·7 to 0·9 inch.
Commercial valuation	...	6*d*. per lb. (nominal).
Remarks	..	As for Rosea.

Variety of cotton	...	Berar Jari.
Description	...	Unginned cotton.
Lint	...	Clean, fairly fine, rather harsh, of moderate lustre, of pale cream colour and almost free from stains.
	...	Yield of lint on ginning, 35·8 per cent.
	...	Yield of lint per 100 seeds, 3·37 grams.
Seed.	...	Small, and mostly covered with short greenish fuzz, but some seeds were covered with a white fuzz of medium length.
Strength	...	Fairly good.
Length of fibres	...	From 0·6 to 1·0 inch; mostly from 0·7 to 0·9 inch.
Commercial valuation	...	6⅛*d*. per lb. (nominal).
Remarks	...	As for Rosea.

Variety of cotton	...	*Bani No.* 3
Lint	...	Clean, fine, soft, lustrous, of cream colour and free from stains.

	... Yield of lint on ginning, 26·9 per cent.
	... Yield of lint per 100 seeds, 2·329 grams.
Seeds	... Small, and covered with short grey, brown, or greenish brown fuzz.
Strength	... On the whole good, but a little weak undeveloped fibre was present.
Length of fibres	... From 0·8 to 1·2 inch; mostly from 0·9 to 1·1 inch.
Commercial valuation	... 6½*d.* per lb. (nominal.)

Variety of cotton	... Bani. Deshi Lahore.
Description	... Unginned cotton.
Lint	... Clean, fairly fine, rather harsh, of moderate lustre, of pale cream colour (nearly white) and almost free from stains.
	... Yield of lint on ginning, 35·1 per cent.
	... Yield of lint per 100 seeds, 3·17 grams.
Seeds	... Small, and covered with short grey, brownish or greenish fuzz.
Strength	... Fair.
Length of fibres	... From 0·7 to 1·1 inch, mostly from 0·8 to 1·0 inch.
Commercial valuation	... 6⅝*d.* per lb. (nominal).

Copy of the valuation report on cottons sent for valuation from Akola Farm to the British Cotton Growing Association.

Referring to your letter of the 11th January 1913, No. 2472, the nine samples of cotton referred to have only reached us within the last few days, and we have submitted them to our expert brokers who report as follows :—

Mark.	Description.	Value.
Rosea No. 1 ...	Clean cotton, rather coarse and harsh, of poor lustre.	6 *d.* per lb. nominal.
Rosea Cutchica No. 1.	Clean, fine, rather harsh cotton, of moderate lustre.	5⅞ *d.* per lb.
Vera No. 1 ...	Clean, fairly fine and cotton rather harsh, of moderate lustre.	6⅛ *d.* „ „
Malvensis No. 4 ...	Clean, fairly fine, and soft cotton, of moderate lustre	6½ *d.* „ „
Buri No. 11 ...	Clean, fairly fine and soft cotton of moderate lustre.	6½ *d.* „ „
Buri No. 1 ...	Clean, fairly fine, rather harsh cotton, of fairly good lustre.	6⅜ *d.* „ „
Berar Jari ...	Clean, fairly fine, rather harsh cotton of moderate lustre.	6⅛ *d.* „ „
Saugor Jari ...	Clean, fairly fine, rather harsh cotton, of moderate lustre.	6 *d.* „ „
Bani No. 3 ...	Clean, fine soft lustrous cotton, of pale clean colour.	6½ *d.* „ „

Report on the Agricultural Station, Sindewahi, and Village.

With the view of furthering the sugar industry in Chanda District the village and tank of Garmusi near Sindewahi were acquired last year. The village comprises an area of 2,748·91 acres, of which 390·64 are culturable. Of the culturable area 173·79 acres were set aside for an experimental sugarcane station. The remaining area will be managed as a Government village, run as far as possible on model lines.

2. About three-fourths of the area consists of black soil known as *kanhar*, a somewhat stiff clayey loam, which is suitable for rabi crops. The other fourth is *wardi*, a sandy loam, which being porous and well drained is the soil *par excellence* for cane.

The analysis of *wardi* soil is given below :—

Fine gravel 3 to 1 m. m.	...	19·67
In 100 gm. of fine soil.		
Coarse sand 1 to 2 m. m.	...	43·35
Fine sand ·2 to ·04 m. m.	...	20·15
Silt ·04 to ·01 m. m.	...	7·88
Fine silt ·01 to ·002 m. m.	...	10·33
Clay below ·002 m. m.	...	13·05
Calcium carbonate	...	0·20
Phosphoric acid P_2O_5	...	·026
Potash K_2O	...	·394
Nitrogen	...	·027
Calcium carbonate	...	·20

3. The land for the experimental farm was handed over to the Department in January last year.

The surface is very uneven, being cut up in many places by nalas and irrigation channels : it is now being levelled and stone bunds have been constructed to check scouring. The whole area has been divided up into blocks for cane, rice and rabi crops.

Blocks are also being laid out for experiments. One set of cane experiments has been started during the current year. Roads and buildings are under construction.

4. The rainfall being heavy, rice is the staple crop of the tract. In black soils *rabi-juar*, linseed and *kultha* are grown as *rabi* crops. *Wardi* soil is cropped with cane, barley and garden crops. The rainfall for the year is shown below :—

Month.			Number of days of rain.	Rainfall, inches.
June	1912	1st half ...	...	...
		2nd ,, ...	1	1·09
July	,,	1st ,, ...	7	4·72
		2nd ,, ...	14	13·42
August	,,	1st ,, ...	12	17·30
		2nd ,, ...	10	8·19
September	,,	1st ,, ...	6	5·04
		2nd ,, ...	1	1·32

Month.		Number of days of rain.	Rainfall inches.
October 1912	1st half	...	...
	2nd "	1	0·30
November "	1st "	...	...
	2nd "	1	0·59
December "	1st "	...	...
	2nd "	...	...
January 1913	1st "	...	...
	2nd "	...	...
February "	1st "	2	1·06
	2nd "	2	0·35
March "	1st "	...	...
	2nd "	...	...
April "	1st "	...	...
	2nd "	...	...
May "	1st "	...	...
	2nd "	2	0·53
	Total	...	53·91

5. The different series of permanent experiments to be carried out are being started this year. Different varieties of cotton and cane were tested last year, with the view of ascertaining the outturns of the former when grown under irrigation, and the degree of immunity of the different varieties of the latter to red-rot. The four varieties of cotton tried were —

(i) Buri.
(ii) Cambodia.
(iii) Roseum.
(iv) Chanda cold season *jari*.

The first two were tried in two different sets of plots. In one set the seed was sown in May and the young plants were irrigated till the beginning of the rains, and again after the rains. In the other set the seed was sown in the beginning of the rains and irrigated after the rains. The outturns are given in paragraph 9. Judging from the results obtained, we believe that the cultivation of long-stapled cottons under irrigation will be highly profitable in the *wardi* soils of this tract.

6. Of the canes under observation it was observed that Red Mauritius was much affected by stem-borers. *Katai* and *pundia* suffered very badly from red-rot. *Katai* is the thin local reed-like cane grown in the district at present. It gives a very poor yield of cane and a low percentage of juice. Ashy Mauritius and Striped Mauritius both did well. The percentage of canes of the different varieties attacked by red-rot is shown in the statement below :—

Names.	Percentage affected with red-rot.
Khari	*Nil.*
Kala	4
Red Mauritius	9
Ashy Mauritius	9
Striped Mauritius	5
Pundia	39
Pounaha	27
Lanji	*Nil.*
Sannabille	9
Katai	50

7. There was a big demand from cultivators for the farm-grown cane. The number of whole canes supplied to these was 37,628. The demand for seed was far in excess of the supply. Twenty acres of cane have been planted on the farm in the year under report. Almost the whole produce of this area will be available for distribution next year. Part of it will be required for seed purposes by the sugarcane estate which is to be opened under Ghorajhiri tank.

8. Groundnut was grown on an area of 3·50 acres of *wardi* soil and yielded 1,238 pounds per acre. The greatest difficulty in growing cane and groundnut in this tract, where pigs abound, is in saving these crops from damage. From the experiments carried out by the Department the following conclusions have been arrived at, *viz.*, that patent woven fencing is quite effective in keeping out pig, if the right type be selected. Type No. 1150 is the best for general purposes. It is an eleven strand fence 50 inches in height and costs from 8 to 8½ annas per yard at Nagpur. 2,876 yards of patent fencing have been erected during the year in my circle by cultivators and about 3½ miles of it on Government farms.

9. To compare the outturns of different varieties of cotton grown under irrigation. The plots were manured by folding 7,000 sheep per acre for one night:—

Name of variety.	Time of sowing.	No. of pickings obtained.	Kapas outturn per acre.	Percentage.	Value of produce.
			Lbs.		Rs. a. p.
Buri ...	1st May 1912	16	1,143	34	221 7 0
Cambodia ...	Do. ...	16	1,005	35	204 14 0
Roseum ...	1st July „ ...	9	980	35	159 11 0
Buri ...	1st June „ ...	13	885	34	165 9 0
Cambodia ...	Do. ...	13	1,027½	35	209 7 0
Chanda *jari* (cold weather) ...	30th September 1912.	3	240	Not valued.	

These very high outturns in a tract where cotton is not grown at present were quite unexpected. Samples of the cotton were sent to Sir Bezonji Dadabhoy, Manager of the Empress Mills, Nagpur, for valuation, and his report was as follows:—

Cambodia has long, strong, woolly fibre. It will make an excellent warp and yarn spinning up to 32s and even 40s. The price will be Rs. 160 per *bojha* of 345 lbs. delivered at Nagpur.

Buri has a long, soft, silky but somewhat weak fibre. The price will be Rs. 155 per *bojha*.

Rosea is too short, rough and coarse. The price will be Rs. 120 per *bojha*.

Classified Receipt Statement of Sindewahi Farm for the year 1912-13.

Details of Credit.

Date of credit.	Forest receipts.	Water-rate.	Farm Produce.	Land revenue.	Miscellaneous.	Total.
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
20th August 1912 ...	245 4 9	9 8 8	...	...	...	254 13 5
„ October „ ...	...	1 0 0	...	...	4 4 0	5 4 0
1st March 1913 ...	...	4 2 4	52 14 5	...	...	57 0 9
28th March „ ...	} ...	1,126 13 1	1,178 9 5	92 14 8	3 15 0	2,402 4 2
30th April „ ...	}					
21st June „ ...	31 0 0	26 12 0	295 11 8	18 0 11	...	71 8 7
29th June „ ...	...	...	14 0 0	...	...	14 0 0
Total ...	276 4 9	1,168 4 1	1,541 3 6	110 15 7	8 3 0	3,104 14 11

D. CLOUSTON,
Deputy Director of Agriculture,
Central Provinces.

Report on the Tharsa Agricultural Station for the year 1912-13.

This agricultural station is one mile from Tharsa station of the Bengal-Nagpur Railway. It was opened last year with the object of solving certain agricultural problems which have arisen in connection with our demonstration work in the area commanded by the Ramtek tank. The greater part of this area is cropped with wheat, linseed and *rabi-juars*, none of which is irrigated. The *kharif* crops grown include a little rice and still less *juar* and *til*. The variety of rice mostly grown is an early one, which only requires irrigation in years of short rainfall. *Rabi* is not irrigated in this tract, so there is no great demand for irrigation. An effort is being made to get the cultivation of a late and heavy yielding rice, namely *gurmatia*, introduced; to get cultivators to sow *juars* under irrigation in the hot weather and to grow sugarcane and garden crops. 11,250 lbs. of *gurmatia* paddy were supplied by the Department to cultivators last year and 7,656 lbs. in the year under report. The *juar* sown on the farm under irrigation on the 18th April 1912 was a very fine crop. It attained a height of 10 feet and yielded 710 lbs. of grain and 16,040 lbs. of undried *karbi* per acre, equal to about 8,000, lbs. when dry, worth in all Rs. 68-10-8. An average crop of *kharif-juar* in this tract ordinarily gives about 400 lbs. of grain and 1,200 lbs. of dry *karbi*, worth in all Rs. 30. It appears, therefore, that a cultivator can increase the outturn of this crop manyfold by sowing in the hot weather instead of a month after the beginning of the rains as is done at present.

The advantage of sowing *juar* in the hot weather is that when the plant is well established before the rains break, its growth is not retarded by the heavy rainfall. *Juar* sown in July is handicapped from the beginning by the fact that the tender plants do not thrive in the water-logged soil and seldom attain a height of more than 4 feet.

2. Paddy on the farm was a very poor crop despite the fact that much attention was given to its cultivation. The poorness of the crop is to be attributed to the fact that the black cotton soil, *Morand II*, on which it was grown, had never produced this crop till last year.

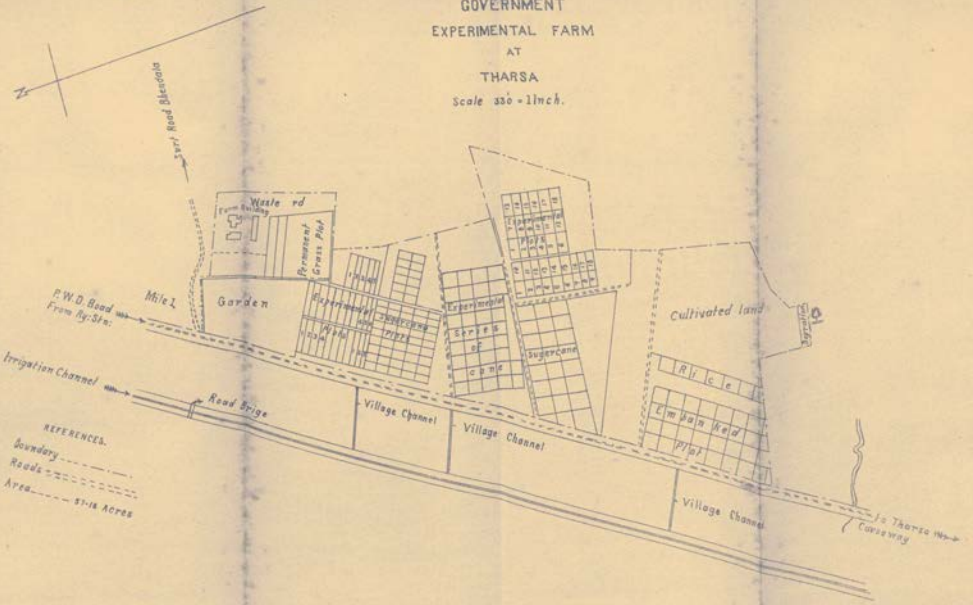
3 The sugarcane on the farm was a good crop. The average outturns were 26 tons for thick stripped and 34 tons for thin stripped varieties per acre. Considering the fact that the soil in which it was grown was rather poor and that most of it had to be planted without any manure whatever, the crop was a remarkably good one: 71,124 whole canes were supplied from this farm to cultivators in the neighbourhood for planting.

The varieties of sugarcane growing on the farm were subjected to analysis at intervals of two weeks during the ripening season by the Agricultural Chemist. The composition of the juice obtained, on the days when each cane showed its maximum amount of sucrose, is given in the tabulated form below.

Variety.	Date of planting.	Date of crushing.	Juice in cane.	Corrected degree Brix.	Sucrose.	Glucose.
			Per cent	Per cent.	Per cent.	Per cent.
Pounda	15th February 1912.	18th March 1913.	66·8	20·1	18·81	·53
Pundia	Do.	Do.	69·9	17·6	15·24	1·59
Sunnabille	Do.	3rd March 1913.	66·8	18·1	16·36	·53
Lanji	20th February 1912.	15th February 1913.	74·5	19·1	17·73	·25
Red Mauritius.	5th February 1912.	18th March 1913.	66·4	17·5	15·19	1·32
Ashy Mauritius	16th February 1912.	1st January 1913.	65·8	17·7	15·81	1·15
Pachranga	17th February 1912.	1st March 1913.	71·3	17·6	15·86	·99
Kala	Do.	Do.	70·3	18·6	17·10	·75
Khari	15th February 1912.	15th February 1913.	65·5	17·8	16·17	·36
Striped Mauritius	16th February 1912.	15th January 1913.	65·7	19·4	17·76	·67

GOVERNMENT
EXPERIMENTAL FARM
AT
THARSA

Scale 330 = 1 inch.



4. The area of the farm is 57·18 acres, of which 49 acres are under cultivation. The soil is *Morand II*, a second class black cotton soil. It is a light soil of its class and has suffered badly by scouring. Its chemical analysis by the Agricultural Chemist is given below :—

	Tharsa No. 3, sugarcane experiment Plot No 57.	Tharsa No. 4, wheat experiment Plot No. 110.
Stones above 3 m. m. ...	...	...
Fine gravel 3 to 1 m. m. ...	4·76	4·28
	In 100 gm. of fine soil.	
Coarse sand 1 to 2 m. m. ...	16·45	16·39
Fine sand ·2 to ·04 m. m. ...	11·53	10·72
Silt ·04 to ·01 m. m. ...	13·66	12·60
Fine silt ·01 to ·002 m. m. ...	15·76	20·70
Clay below ·002 m. m. ...	34·79	31·55
Calcium carbonate ...	1·18	1·45
Phosphoric acid P^2O^5 ...	·032	·023
Potash K^2O ...	·261	·270
Nitrogen ...	·048	·034
Calcium carbonate ...	1·18	1·45

6. To check the damage caused by scouring, series of stone *bunds*, at a distance of about 50 yards apart, have been put in across nalas. As far as possible no water now is allowed to flow off the farm.

7. The fields were *kans*-ridden when taken over by the Department last year: one field of 11·80 acres had for that reason lain fallow for five years. By ploughing and reploughing with the turn-wrest plough, this troublesome weed has largely disappeared and the fields now present a clean and uniform appearance.

8. In the fruit and vegetable garden, young oranges, mangoes, *sapotas* and different varieties of bananas are making very good progress; but vegetables do not thrive so well. The poor show made by most of the vegetables was partly due to want of manure, only *mahua* refuse having been available last year.

9. Groundnut was a good crop on the whole. Both experimental plots gave over 2,000 lbs. of nuts per acre. Soy-bean of the Nagpur variety yielded 990 lbs. per acre. *Cambodia* cotton gave an outturn of 171 lbs. of *kapas* per acre.

10. Of the fodder *sorghums* tried, all did fairly well; but they are not such heavy yielders as the two *rabi-juars* already grown locally.

11. Of the permanent grasses grown under irrigation, *mushel* (Iseilema laxum) and *paonia* (Ischoemum sulcatun) are doing well. Rhodes' grass is now well established, but is not likely to be of much economic value in this part of the world. It tillers poorly and gives but a small bulk of rather coarse leafless grass.

12. Egyptain clover (*Berseem*) was grown in an area of about 10 acres. Three-fourths of that area was fed off by sheep, which were taken from Sindewahi farm, a distance of nearly 100 miles, to manure the area intended for cane. There is great scope for an extension of sheep-folding in this tract where the supply of cattle-dung is very inadequate and the cost high, and where there is a large irrigable area which, if well manured will give big outturns of cane, *chillies*, groundnut and other profitable crops.

13. There is as yet little to report in the way of results obtained from experimental work. The areas are being standardised for experimental purposes, fields are being levelled and cleaned and roads and buildings are being got ready.

14. A meeting of cultivators from Ramtek and Bhandara tahsils was held on the farm on the 20th September, which was attended by the Deputy Commissioner and the Sub-Divisional Officer of Bhandara and by about 500 cultivators.

Character of the Season.

Light showers only were obtained in June: the real monsoon did not set in till the 3rd July. With the exception of a fall of '71 inch on the 23rd November, no rain fell after the 29th September. This early cessation of the rains, followed by an almost rainless cold weather, accounts for the big increase obtained from irrigated wheat.

Statement showing the Rainfall of the year 1912-13.

Months.		No. of rainy days.	Rainfall.	
			Inches.	Cents.
June	1st half	2	...	55
	2nd „	3	...	47
July	1st „	6	3	89
	2nd „	13	8	66
August	1st „	8	17	74
	2nd „	6	8	53
September	1st „	5	1	77
	2nd „	4	4	84
October	1st „	...	...	...
	2nd „	...	...	...
November	1st „	...	...	...
	2nd „	1	...	71
December	1st „	...	...	...
	2nd „	...	...	...
January	1st „	...	...	...
	2nd „	...	...	...
February	1st „	1	...	10
	2nd „	2	...	48
March	1st „	3	...	72
	2nd „	...	...	..
April	1st „	...	...	...
	2nd „	...	...	...
May	1st „	1	...	17
	2nd „	3	...	49
	Total	...	...	49·07

EXPERIMENTS.

SERIES A.—SUBJECT.—To ascertain the variety of cane that will give the largest profit, the plots are to be manured for cane with 400 maunds of cattle-dung before planting and 200 maunds of cattle-dung or 15 maunds of cake

as a top-dressing in the hot weather. The canes are to be grown in rotation with groundnuts—

Variety.	Number of stripped canes per acre.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of juice per acre in lbs.	Weight of gur per acre in lbs.	Percentage of juice to cane.	Percentage of gur to juice.	Percentage of red-rot.	Average weight of canes in lbs.	Value of gur at 15 lbs. per rupee.
		Lbs.	Lbs.	Lbs.	Lbs.			Per cent		Rs. a. p.
1. Khari ...	62,480	96,540	73,870	48,750	8,180	65·99	16·78	1	1·19	545 5 4
2. Sunnabille ...	49,520	106,71.	79,080	52,720	8,865	66·66	16·82	9	1·78	591 0 0
3. Lanji ...	89,920	89,450	64,645	47,600	8,900	73·63	18·70	5	1·65	593 5 4
4. Pachrang ...	30,160	91,570	66,320	49,210	8,545	74·20	17·36	3	2·22	569 10 8
5. Kala ...	35,760	79,15.	62,095	43,420	7,635	68·93	17·58	6	1·66	509 0 0
6. Poundha ...	28,160	70,475	55,640	40,345	7.505	72·51	18·60	47	2·20	500 5 4
7. Red Mauritius ...	37,200	81,045	53,200	37,610	5,68.	70·70	15·10	2	1·34	378 10 8
8. Pundia ...	31,080	90,025	75,830	56,045	9,015	73·97	16·09	54	2·59	601 0 0
9. Ashy Mauritius ...	24,000	57,660	48,285	35,730	6,090	72·93	17·53	3	2·13	406 0 0
10. Striped Mauritius ...	23,400	64,485	47,585	33,860	5.955	71·16	17·59	5	2·35	397 0 0

Of the ten varieties under trial, *sunnabille*, a thin hard variety, the seed of which was obtained from Bombay originally, gave the heaviest yield of cane; the outturn was 43·1 tons of unstripped and 35·3 tons of stripped cane per acre.

Pundia, a thick variety, the seed of which was also obtained from Bombay, gave 4·02 tons of *gur* per acre, which was the heaviest yield in *gur*: the value of this *gur* at the low rate of 15 lbs. per rupee, amounts to Rs. 601. The liability of *pundia* to red-rot detracts somewhat from its merits as a cane for general cultivation.

As a *gur*-yielder *lanji*, a very high quality soft cane of medium thickness, stands second on the list. This variety gave the highest percentage of *gur* to juice.

Both *poundha* and *pundia* were badly affected with red-rot, and Red Mauritius was damaged to a much greater extent than any other variety by stem-borer.

SERIES C.—SUBJECT.—To ascertain the best time to plant thin canes. The plots are manured as in Series A in the year in which cane is grown.

Time of planting.	Number of canes per acre.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of juice per acre in lbs.	Weight of gur per acre in lbs.	Percentage of juice to cane.	Percentage of gur to juice.
Plot I.—25th December ...	64,200	66,568	55,960	35,520	6,960	63·48	19·59
„ II.— „ January ...	59,640	61,840	42,260	26,960	5,180	63·80	19·21
„ III.— „ February ...	42,040	39,575	23,170	13,800	2,680	59·56	19·42
„ IV.— „ March ...	37,000	27,590	19,795	11,800	1,830	59·61	15·50

Though the results of one year cannot be taken as conclusive, the indications are that cane planted before the 1st of January does much better than that planted two or three months later. From a similar series of experiments now being carried out at the Sindewahi farm in Chanda, it would appear that when planted as early as October even, it does better than when put in during February and March, as is done by cane-growers in this part of the Central Provinces. When planted early it makes good progress throughout the cold weather, as the temperature in this part of India is never sufficiently low to retard the growth of the young crop.

SERIES D.—SUBJECT.—To ascertain the best rotation for thin canes manured as in Series A.

	1st year.	2nd year.	3rd year.
Plot	I.—Cane	Cane (ratoon)	Groundnut
,,	II.— ,,	Groundnut	*uar.
,,	III.— ,,	Wheat	Linseed.
,,	IV.— ,,	Groundnut and wheat	Cane.
,,	V.— ,,	Chillies	Chillies.
,,	VI.— ,,	Rice	Cane.

Plot No.	Weight of un-stripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of gur per acre in lbs.
1	82,035	65,215	7,120
2	84,560	64,490	7,385
3	88,155	67,380	6,425
4	81,230	60,300	6,535
5	80,555	53,255	6,045
6	78,665	58,300	6,915

SERIES G.—SUBJECT.—To ascertain to what extent the cane-grower can economise by using top-shoots only for planting. Cane is rotated with *juar* sown on 1st April and is manured as in Series A.

Whole cane setts and top-shoots	Number of canes per acre.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of juice per acre in lbs.	Weight of gur per acre in lbs.	Percentage of juice to cane.	Percentage of gur to juice.
I.—Setts from whole Red Mauritius cane.	40,760	70,390	52,760	37,240	5,640	70·58	15·15
II.—Top-shoots from Red Mauritious...	33,800	53,630	37,225	26,495	4,170	71·18	15·74
III.—Setts from whole *Sunnabille* ...	56,720	75,925	59,290	38,120	6,920	64·29	18·15
IV.—Top-shoots from *Sunnabille* ...	61,360	95,585	70,440	44,910	7,600	63·75	16·92

In the case of the thin variety, namely, *sunnabille* the top-shoot setts germinated better and gave a larger yield than setts from the whole cane. In the case of Red-Mauritius, a thick variety, on the other hand, the plot planted with top-shoots was much more badly damaged by stem-borer than the other, and the yield was less in consequence.

SERIES H.—SUBJECT.—To compare the ridge and furrow system of cultivating thin cane as practised locally with the Madras (bed and furrow) systems and the Java drainage system. Cane is rotated with *juar* sown on 1st May and the plots are manured as in Series A.

Method of planting.	Number of canes per acre.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of juice per acre in lbs.	Weight of gur per acre in lbs.	Percentage of juice to canes.	Percentage of gur to juice.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
I. Ridge and furrow system ...	49,600	72,790	50,080	32,420	5,460	64·74	16·84
II. Madras system ...	56,600	74,930	47,380	31,090	5,220	65·62	16·79
III. Java system ...	50,600	78,150	51,310	32,510	5,760	63·36	17·72

As this is the first year of this experiment, these figures do not justify any definite conclusions being drawn as to the relative merits of the different systems of planting tried. It was observed, however, both on this farm and on others, where the different systems were tried, that by adopting the Madras system a considerabe saving in time and labour was effected, but that the cane grown on the flat according to this method tended to lodge.

SERIES T.—SUBJECT.—To ascertain the heaviest yielding variety of 17 wheats grown under irrigation.

Plot 0·10 acre.

Name of variety.	Outturn per acre in lbs.					
	1911-12.		1912-13.			
	Grain.	Straw.	Grain.	Straw.	Valuation by Ralli Brothers per cwt.	Value of outturn
					Rs. a. p.	Rs.
1.—Pusa No. 4 ...	645	735	705	1,015	5 8 0	39
2.— „ No. 6-A ...	565	655	495	795	5 9 3	28
3.— „ No. 8 ...	620	760	575	1,115	5 10 0	34
4.— „ No. 12 ...	885	995	930	1,125	5 10 0	52
5.— „ No. 107 ...	769	1,051	737	1,037	5 8 0	40
6.— „ No. 108 ...	750	1,010	750	1,330	5 7 0	42
7.—Hard Pissi ...	744	986	812	1,027	5 6 0	43
8.—Howra ...	699	700	332	697	6 0 0	21
9.—Mundi Pissi ...	640	670	720	1,100	5 7 0	40
10.—Hansi „ ...	533	647	602	817	5 9 0	33
11.—Bansi ...	299	701	287	732	6 2 0	34
12.—Tigharia ...	513	547	200	390	5 6 0	12
13.—Sikurhai Pissi ...	713	1,227	965	1,375	5 10 0	54
14.—Poona-Nagpur-Moxaffarnagar ...	674	986	900	1,340	5 10 0	51
15.—Poona Hansia of Broach ...	640	730	260	1,000	5 2 0	16
16.—Lalkesarwali Chalti ...	640	1,070	830	1,250	5 4 0	44
17.—Poona Australian No. $22\frac{28}{32}$ ...	695	855	670	1,400	5 8 0	39

Sikurhia Pissi and Pusa No. 12 have given the largest and most profitable outturns in this irrigated series in the year under report.

SERIES T-2.—SUBJECT.—To ascertain the heaviest yielding variety of 17 wheats grown without irrigation.

Plot—3·10 acre each.

Name of variety.	Outturn per acre in lbs. 1912-13. Grain.	Straw.	Valuation by Ralli Brothers per cwt.	Value of outturn.
			Rs. a. p.	Rs.
1.—Pusa No. 4 ...	407½	632½	5 8 0	23
2.— „ No. 6-A. ...	407½	622½	5 9 3	23
3.— „ No. 8 ...	485	1,007½	5 10 0	28
4.— „ No. 12 ...	522½	1,032½	5 10 0	34
5.— „ No. 107 ...	480	1,010	5 8 0	28
6.— „ No. 108 ...	452½	1,045	5 7 0	26
7.—Hard Pissi ...	370	530	5 6 0	20
8.—Howra ...	282½	567½	6 0 0	17
9.—Mundi Pissi ...	505	1,125	5 7 0	30
10.—Hansi „ ...	545	1,145	5 9 0	32
11.—Bansi ...	452½	937½	6 2 0	29
12.—Tigharia ..	410	805	5 6 0	23
13.—Sikurhai Pissi ...	420	680	5 10 0	24
14.—Poona-Nagpur-Muzaffanagar ...	410	670	5 10 0	24
15.—Poonia Hansia of Broach ...	380	560	5 2 0	19
16.—Lalkesarwali Chatti ...	562½	1,045	5 4 0	30
17.—Poona Australian No. 22$\frac{1}{16}$ ...	510	1,130	5 8 0	30

Both as a dry-crop and an irrigated wheat Pusa No. 12 promises to be one of the very best varieties under trial, and will probably suit this tract, as it is early too.

SERIES U.—SUBJECT.—To find out the best rotation for irrigated wheat.

PLOT I.—Groundnut sown before rains and followed by wheat.
„ II.—Soy-bean followed by wheat.
„ III.—Groundnut at usual time followed by wheat.
„ IV.—Wheat alone.

Plot—·10 acre.

Plot No.	Outturn per acre in lbs. First crop. Grain.	Straw.	Value.	Second crop. Grain.	Straw.	Value.	Value of both crops.	Cost of cultivation.	Net profit.	Loss.
	lbs.	lbs.	Rs.	lbs.	lbs.	Rs.	lbs.	lbs.	Rs.	Rs.
1	2,220	4,500	185	402	497	22	207	55	152	...
2	990	1,910	36	130	320	8	44	48	...	4
3	2,302	4,830	192	60	220	4	196	71	125	...
4	1,185	1,310	65	...	...	...	65	26	39	...

The groundnut sown under irrigation in the beginning of June, *i. e.*, before the rains break is ready for harvesting early in November. This allows ample time for the production of a fair second crop of wheat. When the groundnut is sown in the beginning of the rains, on the other hand, the crop is not ready for harvesting till about the end of November; it is then rather late to grow a crop of wheat. The practice adopted in Plot I should commend itself to cultivators holding lands under the larger Government tanks.

Soy-bean is of no practical value as a crop in these Provinces it would appear; though the yield of grain was large, its value was less than half that of the groundnut plots, and the wheat crop which succeeded it on the same plot was also poor.

In Plot IV wheat was the one crop of the year: the yield was comparatively large, but the net profit derived from this plot fell far short of those two in which wheat followed groundnut.

SERIES X-II.—SUBJECT.—To ascertain the most economical number of waterings for wheat manured with one ton cattle-dung per acre.

Plot—0·10 acre.

Number of waterings.	Outturn per acre in lbs.		
	Grain.	Straw.	Value.
			Rs. a. p.
4 ...	570	660	31 0 0
3 ...	570	600	31 0 0
2 ...	570	605	31 0 0
1 ...	610	615	33 0 0
None ...	512	1,167	30 8 0

In a year like that under report with a rainfall of about $1\frac{1}{4}$ inches during the growing period of the crop, there would appear to be no advantage gained in giving wheat more than one watering.

Statement of Receipt and Expenditure of Tharsa Farm during the year 1912-13 from 1st July to 30th June.

Particulars.	Amount.
	Rs. a. p.
Receipt.	
Sale proceeds credited into the treasury	963 8 11
Other receipts	80 14 6
Value of articles supplied free	17 15 4
Cane given on loan	180 0 2
Total ...	2,862 8 9
Expenditure.	
Purchase of seeds and plants	84 0 2
Repairs of premises	214 0 0
Postage and service telegrams	16 2 0
Bearing charges	0 1 0
Country stationery	0 2 0
Purchase of implements	15 15 0
Repairs of tools and plants	37 0 9
Feed and care of cattle	681 15 6
Manure	920 11 0
Variable labour of agriculture	1,809 5 3
Employés paid from contingency	1,180 14 7
Irrigation charges	100 14 3
Variable labour of earth-work	171 9 3
Packing and freight	416 4 6
Binding charges	10 8 0
Miscellaneous	548 2 0
Wire fencing	1,271 2 4
Total ...	7,499 4 7
Pay of the establishment	1,762 14 8
Travelling allowance	60 11 0
Total ...	1,823 9 8
GRAND TOTAL ...	9,322 14 3

D. CLOUSTON,

Deputy Director of Agriculture,

Central Provinces.

Report on the Telinkheri Seed Farm.

1. The area of this farm was increased by 72 acres in the year under report, and there are now 125 acres under cultivation. The new area acquired will be utilised for the production of fodder crops for the dairy cattle.

2. Owing to the continuous rainfall in the early part of the mansoon, cotton suffered so badly that it was deemed advisable to replough the area and to sow *rabi-juar*.

3. Plant-to-plant selection of three strains of *rosea* has now been carried on for four years; it is interesting to note that the offspring of any one parent differs very appreciably in the percentage of lint to seed which it gives. Plant No. 1 gave an average of 40·9 per cent of lint last year. Seed of six plants of this strain sown in six separate lines this year gave 38·5, 41·6, 40·0, 39·0, 42·6 and 42·6 per cent of lint respectively. The percentage for the whole produce of these lines was 40·7 which is almost exactly the same as that given by the parent plant. It would be interesting to know whether the giving of a high percentage of lint is a character that can be fixed for any one strain by always selecting for propagation the seed of the best plants in this respect. *Rosea* No. 5, which gave 40·8 per cent of lint last year, has this year produced plants the lint percentage of which varies from 38·2 to 42 3. From other selections similar results have been obtained. It would appear that the percentage of lint to seed varies from year to year, being slightly higher when the crop is good than when the crop is poor: but when all the seed of any one mother-plant giving a high percentage of lint is sown, the offspring taken collectively inherits the character of giving a high percentage of lint, though the percentage given by different plants varies. Continuous selection from definite strains will be conducted on these lines, as it has become evident, from the experiments carried out on the Akola farm, that the value of the several cottons under trial is much more dependent on the quantity than on the quality of the lint they produce; that *rosea* is the most productive cotton under trial, and that there is some scope for increasing the lint percentage of this variety by selection.

6. *Buri* grown on an area of 1·75 acres gave 300 lbs. of *kapas* per acre.

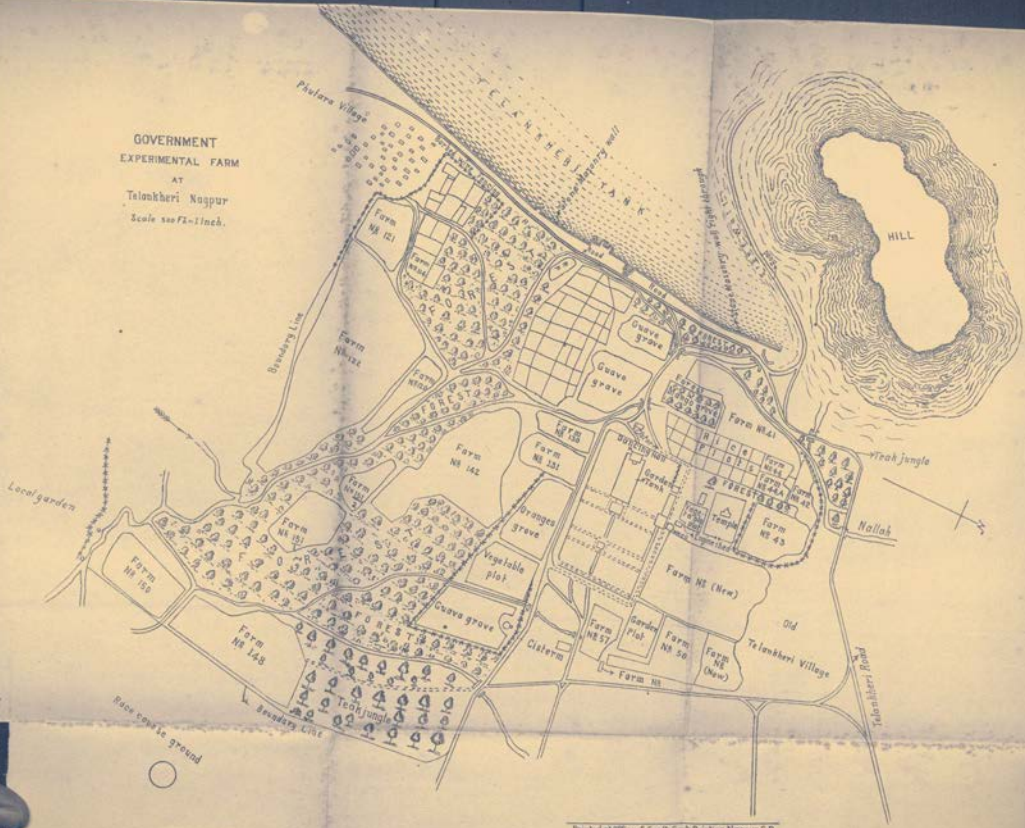
Cambodia again proved too late a cotton for the short rainfall of these Provinces. Allan's long-staple showed some signs of improvement but again suffered from red-leaf blight.

7. Out of 1,350 crosses between *bani* and *rosea*, six were selected last year which were of the third generation. It was noticed that though the plants are fixed in type as regards the colour of the flower and the lobing of the leaf, the percentage and quantity of the lint varies from plant to plant.

8. There were 498 plants of the first and 1,975 plants of the second generation of the cross between *rosea* and *bani*, *bani* being a yellow flowered variety and *rosea* white flowered. In the first generation the seed of 56 bolls was sown in separate lines, all of which produced yellow flowered plants except No. 19, which produced two plants with white flowers. In the second generation out of 1,975 plants 322 had white flowers and 1,653 had yellow flowers.

In the first generation it was noted that five plants out of 150 had broad-lobed leaves while all the others were uniformly narrow-lobed, and that in the second generation the offspring of broad-lobed plants were all broad-lobed with yellow flowers like those of the parents.

9. *Rabi-juar*, tried for the first time on the farm, grew to a height of four feet only. Maize and *juar* will be grown under irrigation throughout the hot weather in future as fodder for the dairy cattle.



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10. Sugarcane was a very good crop. *Khari* gave a big crop both as first and second year ratoon. From this variety a third year ratoon crop will be obtained this year.

Of the 41 varieties of cane under observation the most promising for yield are Java No. 36; Green Tana; B. 376 Red Sport; Java 247 and a Red Mauritius Sport. The percentage of cane affected by stem-borer and red-rot, average number of canes per stool and average weight of each cane, are given in the statement below for 37 of the varieties under observation:—

Serial No.	Name of variety of cane.	Percentage of canes affected by borer.	Percentage of cane affected by red-rot.	Average number of canes per stool.	Average weight per cane.
					lbs.
1	Java 36	14·4	5·5	15	4·55
2	B. 376	14·3	25·0	4·66	5·7
3	Java seed 247 - ..	3·4	5·0	11·8	4·27
4	Tana green	6·25	9·4	5·3	7·2
5	Red Sport	27·3	9·0	7·3	5·0
6	B. 1753	3·3	19·8	5·5	4·16
7	B 1529	...	13·9	6·0	2·8
8	Vellai	8·0	32·0	5·0	5·52
9	B. 147	...	7·5	4·3	5·6
10	Tana (striped)... ...	13·2	42·9	6·6	3·4
11	Pheers Poundha... ...	..	6·8	5·8	6·3
12	Striped Mauritius ...	...	16·6	6·0	4·7
13	Red Mauritius	40·4	24·0	9·0	4·4
14	Pundia	...	19·0	4·2	5·2
15	Red Mauritius with black stripes ...	6·0	15·0	6·8	4·0
16	Poundha	15·0	38·2	6·8	4·0
17	Ashy Mauritius... ...	8·0	5·2	7·5	4·0
18	B. 208	...	...	4·4	2·2
19	Gilmans, red	...	4·3	4·6	4·3
20	Lanji	17·6	...	8·5	3·4
21	Red Mauritius Sport ...	15·3	...	6·5	3·1
22	Bangla	5·4	...	12·3	3·2
23	Kala from Chanda ...	...	...	8·5	3·82
24	Shamsara	22·0	22·0	4·5	3·5
25	Striped Chanda ...	10·5	10·5	9·5	4·2
26	Katai	...	...	1·6	2·0
27	Bilaspur Poundha ...	35·7	...	4·6	3·1
28	Sunnabille	...	...	10·0	3·0
29	Kajli	...	...	6·0	3·4
30	Green Pounda ... -	...	...	9·5	5·05
31	Yuba	...	...	12·5	3·3
32	Balaghat, thin	...	...	6·0	2·3
33	Bansi	...	...	12·0	2·1
34	Red Pundia	100	33·0	1·5	4·4
35	Green-Mauritius ...	...	...	2·0	3·5
36	Chini	...	...	6	1·0
37	Khari	...	...	15·0	2·0

11. Six canes of each variety were planted in six different pits, all the setts obtained from one cane being planted in the same pit. These varieties differed enormously in their yield, tillering power, quality of juice and freedom from disease. The heaviest yielder was Java seed No. 36; the best in tillering power were Java No. 36, *katai* and *sunnabille*. B. 1529 gave the highest percentage of sucrose. All the thick canes were slightly affected by stemborer. Red Mauritius, Red Sport, Shamsara and Bilaspur poundha, suffered most severely. B. 147, B. 1753 American, Malayagir and Green Mauritius germinated poorly. B. 1753 has again shown weak germination this year. Out of 41 varieties Java No. 36 alone flowered. Chini cane obtained from the United Provinces, which arrows freely in Northern India, failed to do so here; but the tendency of a cane to flower would seem to be largely dependent on seasonal conditions. The *khari* cane, which flowered freely last year, did not do so in the year under report. All the varieties are being tried as ratoon canes. The juices of 34 varieties were analysed by the Agricultural Chemist. The analyses are given below.

Analyses of Canes at Telinkheri (Table showing the heighest Values).

No.	Variety.	Date of cutting.	Corrected degree Brix.	% Sucrose.	Co-efficient of purity.	Remarks.
			Per cent.	Per cent.	Per cent.	
1	B. 1529	20th January 1913.	20·5	19·12	94·1	Analyses done twice.
2	B. 376	21st January 1913.	18·5	16·85	92·0	,,
3	B. 147 ...	,, ...	18·2	16·57	92·2	,,
4	Java seed 36	,, ...	18·5	16·03	87·4	,,
5	Villai	,, ...	16·8	14·01	84·3	,,
6	B. 1753	,, ...	16·3	13·99	87·0	,,
7	Java seed 247	,, ...	17·7	15·45	88·7	,,
8	Red-Sport	,, ...	19·0	17·34	92·7	,,
9	Khari	,, ...	16·9	13·82	83·6	,,
10	Tana striped, ordinary ...	29th January 1913.	16·7	13·98	85·9	,,
11	Green Tana ...	,, ...	17·0	14·44	86·7	,,
12	Phears' green pounda ...	30th January 1913.	15·7	13·39	87·6	,,
13	Striped Mauritius ...	,, ...	19·0	17·32	93·1	,,
14	Red Mauritius ...	,, ...	18·0	15·42	87·5	,,
15	Pundia ...	,, ...	18·4	15·94	88·3	,,
16	Red Mauritius with black stripes.	,, ...	16·7	13·19	81·0	,,
17	Poundha ...	,, ...	18·3	16·03	89·4	,,
18	Ashy Mauritius ...	31st January 1913.	18·1	15·55	87·6	,,
19	B. 208 ...	,, ...	19·5	17·84	92·4	,,
20	Gilmanis Red-Sport ...	,,	19·6	17·72	91·8	,,
21	Lanji ...	,, ...	18·6	16·81	91·8	,,
22	Sunnabille ...	,, ...	17·2	14·55	85·8	,,
23	Red-Sport ...	,, ...	16·9	14·01	84·8	,,
24	Bangla ...	4th February 1913.	18·6	16·25	89·5	,,
25	Bansi ...	,, ...	19·3	17·54	93·3	,,
26	Striped Chanda ...	,, ...	17·9	14·25	82·5	,,
27	Kala Chanda ...	,, ...	16·2	12·13	77·0	,,
28	Katai Chanda ...	,, ...	15·0	11·18	77·2	,,
29	Green Mauritius ...	3rd January 1913.	14·5	10·17	71·8	Analyses done only once.
30	Bilaspur pounda ...	20th January 1913.	16·6	14·28	87·2	,,
31	Kajli ...	,, ...	18·8	16·11	87·5	,,
32	Green pounda ...	29th January 1913.	18·8	16·26	88·5	,,
33	Shamsara ...	,, ...	18·0	15·10	85·8	,,
34	Java ...	,, ...	16·4	13·01	81·2	,,

12 Forty varieties of paddy obtained from the Economic Botanist were tried on the farm; 200 heads of each of these were selected and weighed. The best yielders were:—

(a) *Mahaprasad*, (b) *Latia*, (c) *Mudi Kath*, (d) *Molar*, (e) *Kapur Kali*.

13. Egyptian clover (*Berseem-trifolium Alexandrinum*) again gave an excellent crop. It was grown on an area of 2·75 acres which yielded 45 tons. Seed was sown in the standing rice crop just before harvesting, *i. e.*, as *utera*. No cultivation whatever had therefore to be done for the clover. It grew most luxuriantly and gave four cuttings, the first on the 23rd November and the last on the 15th April. Wild lucerne (*Melilotus alba*) has established itself permanently in the same rice area, so that now when the clover seed only is sown, a mixture of clover and wild lucerne is obtained. Dodder made its appearance in some plots in December. The clover plants affected by it died off leaving small blank patches in the plots: but the amount of damage done was not serious. The great difficulty in introducing clover as a green fodder on a large scale lies in the fact that though it grows most luxuriantly under the climatic and soil conditions in these Provinces, it yields only about 60 lbs. of seed per acre. Till some method is devised of getting it to seed more freely it will be necessary to import seed every year. Seed landed at Nagpur costs about four annas per pound at which rate the cost of seed per acre amounts to Rs. 10. When sold as green fodder the produce is worth about Rs. 180 per acre.

14. *Japanese grass* gave an outturn of 1,520 lbs. per acre, but no second cutting. Punjab lucerne, a new introduction, is at present in a promising condition

Shaftal, seed of which was obtained from the same Province, is not likely to be of any value as fodder for this part of India. *Beggar* weed (Desmodium tortuosum) the seed of which cost 6 shillings a pound in London, proved to be of the same species as one of our common weeds, locally known as *chipdi*. It yields poorly, and is therefore quite useless as a fodder.

16. In the permanent pasture experiment a mixture of *paonia* (Ischoemum sulcatum) and *mushel* (Iseilema laxum) in one case and of *marvel* (Andropogon annulatus) and *paonia* in the other gave 28,246 and 20,370 lbs. of green grass per acre respectively.

17. *Soy-beans.*—Five varieties of Soy-beans were tried, *viz.*, yellow, green, brown and black seeded and the Nagpur variety; these on analysis gave the following nitrogen and oil percentages:—

Variety.	Percentage.	
	Nitrogen.	Oil.
Nagpur Yellow ...	5·04	10·39
Bengal „ ...	7·30	10·30
„ Green ...	6·61	18·13
„ Brown ...	6·89	16·47
„ Black ...	7·11	14·81

18. Ten young men from the Episcopal Mission, Chanda, were under training on the farm throughout the year.

G. K. Kelkar, as Superintendent, and D. G. Sawargaonkar, as Overseer, have both worked very well: the former is a young man of very considerable promise.

Statement of the Receipt and Expenditure of Telinkheri Seed Farm, Nagpur.

Receipts.				Expenditure.			
Particulars.	Amount.			Particulars.	Amount.		
	Rs.	a.	p.		Rs.	a.	p.
Sale of grain and cotton ...	658	2	0	Pay of establishment ...	917	0	0
Do. sindi leaves ...	25	12	0	Charges for seed and grain ...	71	11	3
Do. rice straw ...	8	0	0	Repairs of premises ...	638	10	9
Do. bamboos ...	259	12	0	Purchase of cotton seed, cake and salt.	81	8	0
Do. clover ...	212	5	11				
Do. grass ...	603	7	0	Purchase of implements ...	104	12	6
Do karba ...	174	2	5	Repairs of tools and plants ...	119	4	6
Miscellaneous receipts ...	12	12	0	Variable labour on account of agriculture.	2,150	15	3
Cost of 1,000 bamboos supplied to Tharsa.	264	8	0	Servants paid from contingencies.	1,196	0	5
Cost of 500 bamboos to B. Pestonji...	187	8	0	Postage ...	23	10	0
150 lbs. of Sawri to Tharsa ...	15	0	0	Packing and freight ...	71	15	0
100 do. to Sindawahi ...	10	0	0	Carting grass ...	...		
181 lbs. of paddy varieties to Tharsa Sindewahi and Agricultural Chemist.	6	0	0	Miscellaneous ...	462	12	3
10 lbs. groundnut to Nagpur farm ...	0	13	4				
25 „ cotton seed do. ...	1	9	0				
Clover to breeding farm ...	609	0	0				
	3,048	11	8	Total ...	5,838	3	11

D. CLOUSTON,
Deputy Director of Agriculture,
Central Provinces.

Report on Measures taken for Cattle Breeding and Feeding in Chhattisgarh.

1. The aim of the cattle feeding experiment which has been carried out at Nawagaon for the last three years has been fully explained in previous reports. The ten cattle selected for this experiment were ordinary village 'year-olds' of the small Chhattisgarhi breed : they were in poor condition when purchased, having been more or less starved from birth. The results obtained show that when taken in hand at this age and fed properly, bullocks attain to an average girth measurement of 4′ 10″ when four years old ; while village cattle, which have been badly cared for throughout their growing period, average only 4′ 1′ at the same age.

The experiment has also proved (i) that young stock, grazed on spear grass pasture, do quite well when allowed at the same time a little spear grass hay and spear grass silage ; and (ii) that a silo 10′×6′ and 8′ deep is the most suitable size for the *bhata* soil of Nawagaon Reserve.

2. There is little doubt I think, but that the degeneration of the Chhattisgarhi breed has been brought about by centuries of partial starvation. The semi-starved cow yields only about one seer of milk daily for the first half and one half seer for the last half of her lactation period of approximately 7 months. This yield is barely sufficient for the full development of the calf. But the calf does not get the whole even of this small supply : the owner of the cow takes the milk for his own use three days out of every four ; while the *raot* (herdsman) claims it every fourth day. The calf being only allowed the dregs of a small udder, subsists but does not thrive ; its growth is checked from the very beginning.

3. The feeding experiment carried out at Nawagaon has shown that when taken in hand when one year old, and properly fed up to the age of four, we can produce an animal that is 9″ more in girth than the average village bullock of the same age. Had we gone back one stage further by starting with calves instead of 'year-olds', a greater increase in girth would undoubtedly have been obtained. Had we gone back yet a further stage by seeing that the pregnant mothers were properly fed, still better results would have been obtained. The average girth of two bulls of a wild herd of this small breed recently captured at Siltara, 22 miles from Nawagaon was 5′ 4″. These had been suckled by their dams and had by virtue of their predaceous habits enjoyed good food throughout their whole period of growth. These figures give an indication of the possibilities of cattle breeding as a means of increasing the size of draught animals in this Division. Cattle breeding on proper lines should include not only proper feeding but the careful selection of the best animals to breed from. This will be done on the breeding farm opened in March of the current year on the Chandkuri Fodder Reserve, 9 miles from the Raipur Farm.

4. Forty good cows and one bull were purchased for the farm in three Zamindaris, namely, Bindra-Nawagarh, Panabaras and Ambagarh-Chowki. In these Zamindaris there are large grazing areas in the jungle and the cattle are better than those of the open country, where the population is much more dense and where the grazing area is much more limited. The best cows were obtained in Bindra-Nawagarh from large herds belonging to *Banjaras*, a nomadic race of professional cattle-breeders and dealers.

The Reserve comprises an area of 268 acres, the greater part of which is *bhata* and *bhata-matasi* soil. There is a small area of black soil. Most of the area is irrigable from Kurud tank, and fodder crops including clover, maize, juar and the better grasses will be grown under irrigation throughout the cold and hot weather. A start was made by sowing 20 acres of juar and maize in April of the current year ; at present both crops are promising.

5. The main object of this farm will be to rear good cows and bulls for the owners of private breeding farms.

Eight privately owned breeding farms and one Cattle Breeding Union were opened in the year under report through the influence of the Department. The Nawagaon Breeding Union has started with 40 cows and one bull. It is proposed to lease the Nawagaon Fodder Reserve to the Union and the Pachera Fodder Reserve to Khan Sahib Israel Talabuddin, Malguzar of Khandwa, for cattle breeding. The stock for the Union and for one of these privately owned farms was selected by the Divisional Superintendent of Agriculture and myself.

6. Of the four existing breeding farms in this Division, the Divisional Superintendent and I inspected three in the cold weather. Of these three, the Indagaon Farm in Bindra-Nawagarh is the best. The stud bull is distinctly good and about half the herd of 37 cows are very good types of the Chhattisgarhi breed. The kutcha sheds are clean and comfortable. The Zamindar has been advised to maintain a stock register and to discontinue the practice of milking the cows for the production of 'ghee.'

The Zamindar of Ambagarh Chowki has made a very good beginning with a breeding herd of 21 cows, one bull and 28 calves. Here too the kutcha sheds are quite comfortable, and the cows, though not equal to those of Indagaon, are a much better lot than exist in the surrounding villages. The bull is not large enough. A stock-register is being maintained, and the Zamindar has also agreed to keep an inspection-book for the farm, in which remarks will be made henceforth by inspecting officers. Lucerne is being grown in the Zamindar's garden as a fodder crop.

The Mohalla breeding farm opened by the Panabaras Court of Wards carries a herd of 49 cows, two bulls and 56 young animals. Some of the cows are not good enough to breed from, and the bull is not large enough to give size to his offspring; but taken as a whole the herd is much better than one finds in the village.

Judging from the poor condition of some of the calves, it seems doubtful whether the *raots* in charge are not having a share of the milk. The Manager, as advised by the Deputy Commissioner, is trying clover and juar under irrigation as green fodders.

7. A promising beginning has thus been made in establishing cattle breeding farms in this Division. An interest in the movement has been awakened and leading land owners are alive to the importance of the work.

8. Nineteen semi-wild cattle, which formed part of a herd of about 50, which have for many years lived in the neighbourhood of Siltara village were captured in March and April of the year under report. The remainder of the herd will shortly be accounted for.

D. CLOUSTON,

Deputy Director of Agriculture,

Southern Circle.

Report on the Telinkheri Cattle Breeding Farm.

Three-fourths of the area under this farm is hilly. The thin red soil is covered with stones and there is trap rock near the surface. The remainder, occupying as it does the slopes of the valleys adjoining the tank, is black soil and produces good grass. On the hilly portion the grass is chiefly spear grass with a small admixture of *sheda*. From December till the end of July the grass on the hill is parched and the amount of grazing is scanty, but the valley affords a small amount of grazing during the earlier part of that period. The area of the farm is about 350 acres of which about 100 acres were kept for hay. The quality of the pasture being poor the stock receive a certain amount of stall feeding except in the latter months of the rains and in the early part of the cold weather. Hay is the chief fodder fed, though clover and silage are given when in excess of the requirements of the dairy stocks in the neighbouring area.

"The cows were allowed 10 pullas (4 lbs.) per head, while grazing was of any value, but during the hot weather this was increased to 9 or 10 lbs. With the heavy demand on the hay supply, fodder was somewhat short at the end of the late hot weather and great care had to be taken to make it last till June, when outside supplies had to be called in.

Cotton-seed and cotton-cake to the amount of 2 lbs. per head were given from 15th April to the end of July, and in addition during the year of report about 2 lbs. of rice bhusa as an addition to the grass, as the animals entered on the hot weather in somewhat low condition. A few cows in poor condition receive a little cotton seed throughout the year.

In the early part of the year the health of the stock was well maintained and there was no outbreak of infectious disease till April, when rinderpest broke out, and though inoculation had been resorted to a day or two before the first case, several animals died, including the stud bull. Later liver-fluke and tick-fever were responsible for a number of deaths on the breeding herd area, but not so much among the farm-herd itself as among cows lately brought from Arvi and the wild cows caught in Buldana.

Liver-fluke on diagnosis was directly traced to a snail prevalent on the wet margin of the tank, from which water recedes very rapidly during March and April, in the portion bounding on the breeding herd enclosure and where the animals are taken for watering. A well has, however, since been made above the margin of the tank in the hot seasons and this source of trouble is definitely removed. It may be noted here that the dairy stock was watered at this tank; but near the bund and when the snail is absent, did not contract this parasite.

Tick-fever was directly traced to a certain tick with which all the sheds on the grass farm area were badly affected. In the old bull shed near the wild-cattle shed even the iron work pillars were covered with these insects. Their presence was also marked in the old part of the dairy sheds and in the breeding sheds. The Veterinary authorities credited their presence to the old wood-work and mud plaster feeding troughs. Active steps were taken to remedy these defects. All the animals were kept out of the sheds for from six weeks to two months. The worst types of feeding troughs were removed and destroyed, and in certain cases replaced by those of a different design, all crevices were sprayed, plaster was repaired and the masonry of the walls was whitewashed. Such wood-work as was for the time being left was heavily tarred and all iron-work frequently fired. The dairy shed and dry-stock and wild-cattle sheds may now be said to be cleared of ticks. The breeding herd shed is apparently free, but requires considerable reconstruction in order to ensure that there shall be no recurrence of the pest next hot weather. The death rate was to some extent increased by the fact that the animals, in spite of increased food, were in comparatively low condition. The wild stock and Arvi cattle made less progress on the spear grass hay than the breeding herd proper, and being less accustomed to the environment and feeding were more succeptible and withstood the attack worse. Wood mud plaster and even brick-in-mud walls—in fact anything which may break into crevices unless frequently attended to, are undesirable in buildings intended for animals in this country." (R. G. Allan).

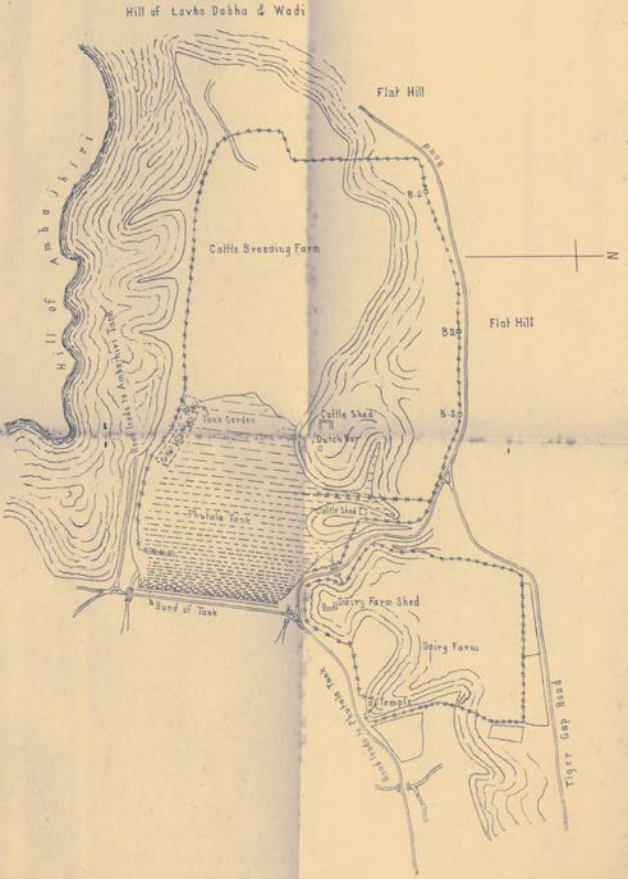
There was a ready sale of bulls from the herd. All the available stock was cleared; eight bulls were sold off, fetching Rs. 1,380. The average price realized was Rs. 172-8-0 as compared with Rs. 132 in 1910-11 and Rs. 159 in 1911-12.

SITE PLAN

SHOWING THE DAIRY & CATTLE BREEDING FARM

AT NAGPUR

Scale 200 ft. = 1 inch



The balance sheet shows that the breeding farm section of the grass farm, inclusive of grass sales from the area, made a profit of Rs. 1,300 for the year.

"Feeding experiments with the various available cattle foods are in progress.

The following experiment has been completed:—

To compare equal money values of cotton seed and undecorticated cotton cake fed to heifers and young bulls.

Eighteen animals were included in the experiment, nine of each sex. Six animals were maintained on a basal diet of hay and rice bhusa 4 lbs. The other two groups were fed in addition to this with 2 lbs. of cotton seed and 3 lbs. undecorticated cotton cake (of equal money value), respectively.

The following statement gives the results:—

Diet.	Heifers 9, 3 on each feed.	Bulls 9 3 on each feed.
	Average gain or loss.	Average gain or loss.
Basal diet	+ 1 lb.	— 4 lbs.
Basal diet and cotton seed	+ 14 lbs.	+ 13·55 ,,
Basal diet and cotton cake	+ 30·6 ,,	+ 29·6 ,,

The average gain of both sexes over the basal diet in the case of cotton seed is 17·65 lbs. per head and in the case of cotton cake of the same money value is 33·6 lbs. The consistency of the figures in both cases emphasizes the marked advantage of the cake over the seed as a commercial feeding stuff for stock. The whole of each group was kept on the basal diet for three weeks before the test was made. The feeding period extented over 60 days. The animals ranged in age from one-and-a-half to two-and-a-half years of age, but the distribution in each group was arranged to make the average age of the animals on each diet alike. As a diet for growing animals in which a steady increase of weight is desirable, the last is so distinctly superior as to require no comment. An experimental feeding comparison of cotton seed and til cake is now in progress and other tests with safflower cake, linseed cake and the various bhusas and mahua will be taken up later." (R. G. Allan).

Statement of the Receipts and Expenditure of Telinkheri Cattle Breeding Farm, 1st July 1912 to 30th June 1913.

Particulars.	Amount.			Particulars.	Amount.		
Receipts.	Rs.	a.	p.	*Expenditure.*	Rs.	a.	p.
Sale of bulls ...	1,380	0	0	Repair of premises ...	36	4	7
Sale of grass ...	450	0	0	Purchase of implements ...	80	0	0
Cost of 250,000 pullas of grass to Nagpur Farm.	750	0	0	Feed and care of cattle ...	1,051	4	0
Cost of 140,000 pullas of grass to Telinkheri garden.	420	0	0	Variable labour ...	408	0	0
Cost of 5,000 pullas of grass to Thars Farm.	15	0	0	Cost of cutting grass dry ...	404	8	0
Cost of 92,109 pullas of grass supplied free to gaolis	276	5	3	,, green ...	178	5	9
Cost of 77 cartloads of green grass to Maharajbagh.	115	8	0	Miscellaneous ...	10	11	6
Cost of 11 cartloads of green grass to Telinkheri Garden.	16	8	0				
Cost of 13 cartloads of manure to Telinkheri Garden	13	0	0				
Cost of 30 cartloads of manure to Tharsa.	30	0	0				
Sale of manure ...	1	8	0				
	3,467	13	3		2,169	1	10

Sheep Breeding.

A study of the diseases to which the local breeds are subject has been taken in hand by the Superintendent, Civil Veterinary Department. His report is given below.

Report on the Diseases of Sheep at Sindewahi and Telinkheri Government Farms.

"During the past nine months I have had a number of *post mortem* specimens of tissue, blood, etc., from the sheep kept at the Telinkheri and Sindewahi Government Farms. I have also seen the sheep at Telinkheri but not at Sindewahi.

The sheep have been suffering from several fatal diseases, the clinical appearances of which are very indefinite. The most frequent disease, and apparently the most fatal, is very acute, animals are not ill for more than a day or two and then die from what would appear to be an acute septicæmia. I have only been able to make a very incomplete bacteriological examination consisting of a microscopical examination of blood-smears, liver tissue, spleen, intestines, lungs, etc It was not possible to make a culture as the laboratory is not yet ready. From the above observations it would appear that the cause of death was a rod-shaped anthracoid organism, which differed slightly from arthrax and malignant œdema. Its presence was constant in the blood.

The disease is only in evidence during the rains, and probably if animals were kept continually upon high ground and corralled in fresh corrals every night in dry sheltered places there would be no fatality. I have not encountered this particular form of microbic disease during any of my investigations in the Punjab into sheep diseases, and have not heard of its prevalence in other parts of India. The symptoms and rapidity of the course of the disease are somewhat similar to braxy in Scotland; but the presence of the distinctive organism appears to differentiate it effectually from that disease.

Animals which died of a more or less acute pernicious anæmia I found to be affected with anchylostoma in the fourth stomach and duodenum, which no doubt was the cause of the death. I have had no time to work out the variety of dochimus but hope to give it further study. The fatal effects of ankylostoma are well known and require no description.

I also found in some of the sheep varieties of strengyles, probably cervicornis contortus. There were a few grassilis. All these parasites may be fatal, but I doubt if these were sufficient to cause the amount of disease which was fatal to so many sheep. The fatality was mostly due to ankylostoma.

I was somewhat surprised to find but few œsophagustoma, as this parasite is very prevalent in Madras and in the Punjab.

There was also an entire absence of fluke disease and bilharzia, although the latter is common in the Punjab.

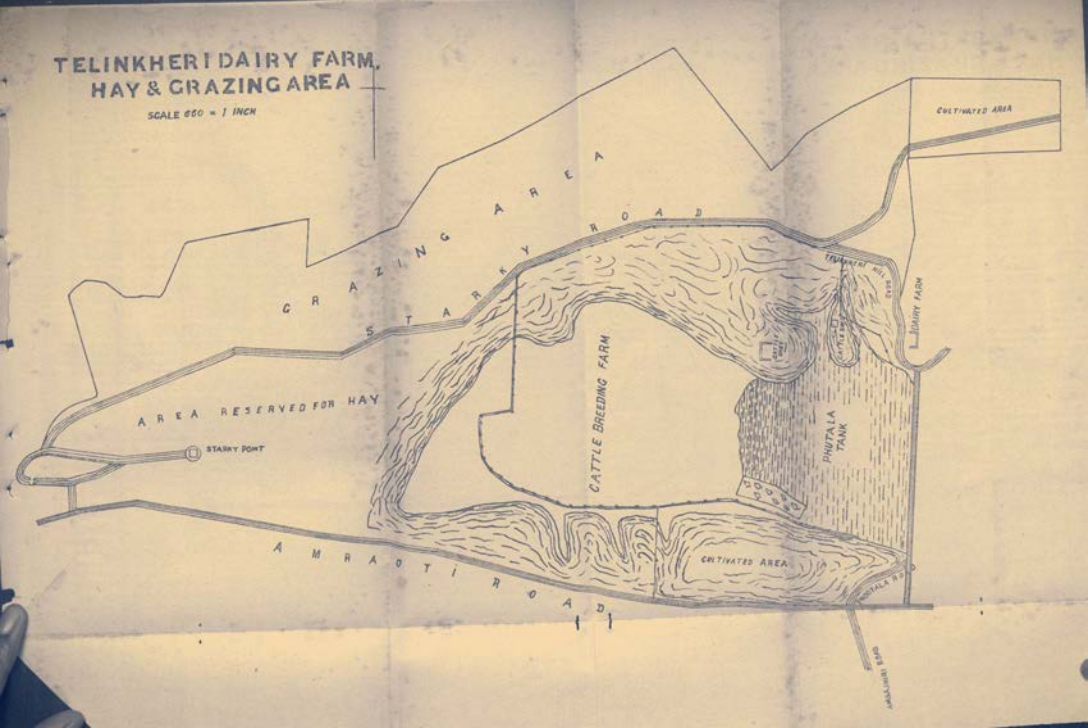
Preventive treatment for these parasitic affections is difficult, and the only suggestions I can make are, to keep animals from grazing in low-lying swampy places until some two or three months after the subsidence of the rains; frequent changes of grazing, and when possible to thoroughly lime the grazing grounds, or to bush off the grass during the dry season."

There are two distinct breeds under observation, *viz.*, (i) the breed found all over the Deccan, and (ii) a tall long-legged goat-like breed, specimens of which were obtained from Sironcha tahsil in Chanda. The whole flock now consists of 347 ewes, 6 rams and 44 lambs.

The sheep were dipped in Cooper's dip twice during the year; it has been noticed that the sheep kept on Telinkheri hill, where the standing ground during the rains is well drained, are much less subject to disease than the Sindewahi flock. It has also been observed that the sheep shorn at the end of the rains were more subject to colds than those shorn at the beginning of the hot weather

Merino rams will be obtained shortly and crossing with a view to improve the quality and to increase the quantity of wool will be started.

D. CLOUSTON,
Deputy Director of Agriculture,
Southern Circle.


TELINKHERI DAIRY FARM,
HAY & GRAZING AREA
SCALE 660 = 1 INCH
GRAZING AREA
STARRY ROAD
CULTIVATED AREA
DAIRY FARM
CATTLE BREEDING FARM
PIHTAIA TANK
AREA RESERVED FOR HAY
STARRY POINT
CULTIVATED AREA
AMRAOTI ROAD

Report on the Telinkheri Dairy Farm, 1912-1913.

The dairy farm at Telinkheri for the breeding of milch cattle was started last year with about 14 animals, by setting aside nearly 125 acres of the area under the breeding farm. During the present year, however, some further additions have been made to the dairy herd, besides the milch cattle belonging to the gaolis of Gadgapeth, Nagpur, which were admitted in the herd under special conditions to be described in a later section of this report. It was thus found necessary to acquire a fairly large area of land to be able to supply grazing and fodder to a big herd of dairy cattle. An area of 730·16 acres is already acquired and about 53 acres is to be acquired shortly, bringing the whole area reserved for this purpose up to 783·16 acres.

The diary herd at Telinkheri, as at present composed, consists of two parts (i) Government cattle ; (ii) Gaolis' cattle. Each one will be dealt with separately.

(i) *Government Cattle.*—Last year the dairy herd consisted solely of Government cattle. They numbered—

8 Delhi buffaloes with calves.

1 Delhi buffalo bull.

4 Hansi cows with calves.

1 Montgomery bull from Pusa.

During this year, 17 'Arvi' cows and two local country type of buffaloes were bought through the Tahsildar of Arvi (Wardha district) and added to the herd. Ten of the newly purchased 'Arvi' cows were found to be bad milkers and were hence transferred to the breeding herd in exchange of ten of the 'Gaolao' cows, whose milking capacity was to be tested. Six more of the country buffaloes were bought locally and the result of mating the local type of buffalo with the Delhi bull will be awaited with interest.

The herd was affected with rinderpest which broke out as an epidemic during the latter part of the year. All the animals were inoculated twice during the season, and all, but one Delhi buffalo which succumbed to the attack, were saved from the ravages of the disease. Besides this, three cows died during the year from general debility and old age. The strength of the herd as at present composed is as follows:—

Buffaloes.		Buffaloe bulls.	Cows.		Bull.	Calves.				Number of animals.
						Buffaloes.		Cows.		
Delhi.	Local.	Delhi.	Hansi.	Gaolao or Arvi.	Montgomery.	Delhi.	Local.	Hansi.	Local.	
7	8	1	2	17	1	9	2	4	13	64

64 animals in all.

Feeding.—The rations fed to the buffaloes and cows vary greatly according to the quantity of milk yielded by each individual animal. The total weight of concentrates given to each animal per day is about two-third of its daily yield of milk. It consists of cotton seed, 'chuni' (pulse meal), wheat bran and oil cake (til or cotton seed) mixed in almost equal proportions. Besides this, green succulent, fodder is given when available on the farm, *e. g.*, clover, during the cold season, ensilage, etc., in the hot weather. The grazing is supplemented with a feed of hay at night when the cattle are tied in the sheds.

Average Milk Yield.—A record of the daily yield of milk is kept regularly for each animal and the averages for the different breeds are tabulated below. Of course, some of the animals were already in milk for sometime before they were brought to the dairy farm; while the averages given below are calculated from the amount of milk they yielded after joining the Government Dairy herd. They should therefore be accepted with a reserve Again, the animals brought from Northern India take some time to acclimatise before they begin to yield their full quota of milk.

Kind of animal.	Breed.	Number of animals.	Average daily yield of the best animal during milking period.	Number of days in milk in 1912-13.	Average daily yield of all the animals during milking period.	Average days in milk in 1912-13.	Total yield of the best animal.	Average total yield of all animals.
			lbs.		lbs.		lbs.	lbs.
Buffalo. ...	Delhi ...	6	9·85	273	8	250	2,692	2,005
Do. ...	Local ...	None of the animals has completed one full lactation period.						
Cow ...	Hansi...	4	4·25	293	3·5	299	1,242	1,062
Do. ...	Gaolao and Arvi..	2	3·5	240	3·25	242	840	787

Apparently the total yield of milk is in all cases very low indeed.

Statement of receipts and expenditure of the Telinkheri Dairy Farm, 1912-13.

Receipts.				Expenditure.			
Particulars.	Amount.			Particulars.	Amount.		
1	2			3	4		
	Rs.	a.	p.		Rs.	a.	p.
Milk—							
From 1st July 1912 to 30th June 1913.	1,899	9	7	Interest on capital spent for acquiring grazing area 730·16 acres at 5 per cent.	975	0	0
Grazing—							
From 1st July 1912 to 30th June 1913.	500	12	2	Interest and depreciation on fencing and building at 5 per cent.	672	0	0
Hay—				Interest and depreciation on outfit and live-stock at 15 per cent.	240	12	0
In all 977,000 pullas were cut, out of which 106,654 pullas were given free to *Gaolis* for deficient grazing in summer months. Out of the 870,346 pullas sold, only 5,000 were sold at Rs. 4 per thousand, the rest at Rs. 2 per thousand.	2 616	1	1	Staff ...	503	0	0
				Grass ...	1,219	8	0
				Karbi ...	160	0	8
				Clover ...	147	10	0
				Concentrated foods, cotton seed, chuni &c.	1,293	14	3
				Salt ...	30	0	0
				Cutting and carting of hay ...	967	0	0
				Miscellaneous ...	247	12	0
Total receipts ...	5,016	6	10	Total expenditure ...	6,456	8	11

Gaolis' Cattle.—One of the objects in view in organising a dairy farm at Telinkheri is to supply pure milk to the citizens of Nagpur. The milch cattle

belonging to the Government Diary herd are too few to meet the demand. A movement was therefore set on foot about two years ago to organise a co-operative credit society among the Gaolis of Nagpur and eventually bring them under the control of the dairy farm. As a result of the various efforts made in that direction, the 'Laxmi Sabha' of the Gaolis of Gadgapeth, Nagpur, was organised and registered on the 3rd of October 1911, as an urban industrial co-operative credit society. Thirteen members joined the society at the start, and an offer was made to take their cattle under the control of the dairy farm on certain conditions. A large area of grazing land was subsequently acquired and attached to the dairy farm to enable the supply of sufficient grazing and fodder for a fairly big dairy herd. The Gaolis' cattle were admitted in the herd on the 1st of December 1912 on the following main conditions :—

(i) All the animals must be examined and passed by the Veterinary Assistant attached to the farm before being admitted in the Government dairy herd; and after admission, they are on no account allowed to leave the precincts of the dairy farm and mix with any other herd without the special permission of the Deputy Director of Agriculture or his assistant in charge of the farm.

(ii) Feeding, grazing, milking, grooming, etc. of the animals must be done either by the owners themselves or by their servants under the supervision of the farm staff. Milk will be drawn in clean pails provided by the farm and not in dirty brass pots ordinarily used by the Gaolis for this purpose. The Gaolis will be responsible for the washing and cleaning of the pails used by them, and the farm overseer will see that all the utensils are properly washed and cleaned before and after milking, and the milk is drawn in a clean manner.

(iii) The Gaolis' cattle will be housed in the *pucca* galvanized iron shed newly erected in extension of the old dairy shed on the Telinkheri hill. An inclusive charge of one rupee per month per every head of milking animals, and eight annas per month for each of the dry animals will be made for the grazing and housing of the animals. (These charges were reduced to half of the above rates from the 1st of March 1913, the Gaolis being stopped from turning their cattle dung into cakes for sale.)

(iv) Other fodders provided by the dairy farm will be charged as under :—

Hay	...	at Rs. 3 per 1,000 pullas.
Karbi	...	at Rs. 1 per 100 seers.
Clover and such other green fodder	...	at Rs. 1 per 120 seers.
Ensilage	...	at Rs. 1 per 50 seers.

Cotton seed, chuni, wheat bran and such other concentrated food stuffs will be bought at the wholesale rate at the best time of the year for buying such materials from a special grant allotted for this purpose and stored at the dairy farm. They will be supplied to the Gaolis at cost price.

(v) Milk will be made over to the dairy farm at nine seers per rupee, which will in turn hand it over to Messrs. Byramji and Company of Nagpur at the same rate. Messrs. Byramji and Company have built a small dairy shed at the foot of the Telinkheri hill where they carry on the operations of distributing milk in bottles for customers, and separating and turning into butter any surplus left after supplying the milk demands of all the customers. They sell milk to their regular customers at 6 seers per rupee as specified in their agreement with the Government, a margin of 3 seers per rupee is thus left to cover the charges of supervision, distribution, commission, etc., on the part of the contractor.

(vi) The Gaolis must carry out every measure of segregation, inoculation, etc., which may be suggested by the Veterinary Department in the event of an epidemic breaking out in the vicinity of the farm.

As a compensation for the comparatively cheap rate at which the Gaolis seem to sell their milk to the diary farm, they get foods and fodders grown on the farm at a rate much lower than the current market rate for these materials. They also get the advantage of being able to buy their concentrates for the whole year at a wholesale rate at the cheapest time of the year by means of a special provision made for the purpose in the budget of the dairy farm. Further they get the free services of a good Delhi buffaloe-bull and a Montgomery bull kept at the dairy farm, for mating with their buffaloes and cows, which will go a long way in improving the milking strain of their cattle.

Ever since they joined the dairy farm, the Gaolis have been a source of infinite trouble to the staff of the farm. They are always on the look out for an opportunity to steal the fodder or food-stuffs available at the farm or to graze their cattle in the fields of growing crops. A lot of damage is thus occasionally done to some of the crops of the farm. Five out of the thirteen original members of the Gaoli society were found to be too poor and negligent of their duties to continue long in the society. They were therefore made to retire from the membership and some six new members from the Gaolis living in the 'Sadar' side of Nagpur were admitted in their place.

On the approach of the hot weather many of the Gaolis' cattle began to dry up, and most of the members seemed unlikely to be able to make both ends meet, unless helped in some way or the other to buy fresh milking animals.

Several efforts were made to move the Co-operative Central Bank of Nagpur to grant a loan of Rs. 2,000 to the Gaoli society, but the bank hesitated to make the loan owing to the perishable nature of the assets of most of the members. At the time of the crisis, however, the bank rose to the occasion and agreed to grant the loan of Rs. 2,000 as desired by getting all the animals belonging to the members of the society under the control of the dairy farm pledged to the society in a proper legal form. The loan was made on the 19th of May 1913 and it is arranged to be paid back with interest in eighteen different instalments.

Gaolis' Accounts.—Foods and fodders for Gaolis' cattle are regularly issued every day according to the daily needs of each individual member of the society and the accounts are kept by the farm overeer in a separate register. At the end of every month the charges for the various food stuffs issued during the month are totalled up separately for each member and are deducted from the milk bill of each member for that month. No outstanding bills for food stuffs remain therefore to be collected. The following is a monthly statement of the receipts and expenditure of the Gaolis working under the control of the dairy farm :—

Table I.

Month.	Number of milch animals.	Number of dry animals.	Total number of animals.	Value of milk supplied.	Value of foods and fodder bought.	Profit.
				Rs. a. p.	Rs. a. p.	Rs. a. p.
December 1912 ...	66	64	130	684 6 5	490 7 8	193 14 9
January 1913 ...	76	59	135	776 13 8	493 1 5	283 12 3
February 1913 ...	77	92	169	674 3 1	429 11 6	244 7 7
March 1913 ...	72	102	174	651 2 11	491 8 1	159 10 10
April 1913 ...	66	94	160	504 2 2	397 0 8	107 1 6
May 1913 ...	66	97	163	450 1 6	348 14 10	101 2 8
June 1913 ...	52	107	159	407 14 11	375 11 8	32 3 3
			Total ...	4,148 12 8	3,026 7 10	1,122 4 10

Table II.

Average number of milch animals.	Average number of dry animals.	Total profit at the end of seven months.
		Rs. a. p.
68	88	1,122 4 10

Thus, even after paying the maintenance charges of more than an equal number of dry animals, the milking animals (buffaloes and cows mixed) of Gaolis have been able to show a return of about Rs. 17 per head after seven months' working. The Gaolis' cattle are naturally not of the best milking strain, and the past seven months include the worst months of the year (*viz.*, hot weather months when the pastures are scorched and dried up) for the yield of milk. The milk yield will steadily increase during the remaining five months of the year, as the pastures are getting filled again with grass for grazing and many of the dry animals will shortly calve. We may therefore at the end of the year expect, without any fear of exaggeration, a return of about Rs. 25 per head for each of the milking animals, beyond paying the maintenance charges of at least as many dry animals as the milking ones, throughout the year. Such a return is certainly creditable considering the general quality and condition of the Gaolis' animals.

G. D. MEHTA,

Assistant Director of Agriculture,

Central Provinces, Nagpur.

Report on Implement Depots.

The following statement gives the number of implements disposed of in the Southern Circle during the year :—

Sale of Agricultural Implements in 1912-13.

Name of implement.	In Berar Division.	In Nagpur Division.	In Chhattisgarh Division.	Total.
1	2	3	4	5
Turn wrest ploughs	137	25	...	162
Shares for do.	70	18	...	88
Mould board brackets for do.	2	...	...	2
Mould boards for do.	6	...	...	6
Bridles for do.	14	...	...	14
Wheels for do.	1	...	...	1
Pairs of stilts	1	...	...	1
Iron clips	2	...	...	2
Fodder cutters	70	1	...	71
Bullock gears	13	1	1	15
Intermediate motions	12	...	...	12
Akola hoes	100	...	...	100
Burn and Co.'s hand hoes	2	...	...	2
Bolts for shares	35	...	...	35
Chain pumps	1	...	1	2
Grinding mills	2	1	...	3
Cotton gins	4	...	...	4
Oil engines	5	...	...	5
Centrifugal pumps	5	...	...	5
Brass vessel for Gardner's oil engine	1	...	...	1
Burn nipples for do.	2	...	...	2
Watt's beam plough	1	...	...	1
Winnowers	...	1	...	1
Corn shellers	...	2	...	2
Sugarcane mills	...	16	13	29
Iron parts of winnowers	...	3	...	3
Meston ploughs	...	1	4	5
Page's fencing	2,860 Yards.	...	...	...

The demand for improved implements and machinery continues to grow, more especially in the cotton tract. The sale and distribution of iron ploughs has been greatly facilitated by the appointment of honorary agents who stock them for sale in their respective tahsils. These agents are members of their District Agricultural Associations and are in close touch with the Department.

The No. 3 turn wrest plough, which is the one in greatest demand, is manufactured by Burn and Company, Calcutta. The Department is co-operating with this firm in effecting improvements in this and other implements made by them for sale in the Central Provinces.

The demand for oil engines continues to grow. They are being used principally to drive small ginning plants on private cotton seed farms. To assist purchasers in setting up, and when necessary to repair these plants, two trained mechanics have been employed by the Department.

The Nahan cane mill costing Rs. 130 continues to find favour among cane-growers. These, when properly set up, were found to extract up to 75 per cent of juice this year when thick canes were being crushed. A good many of Burn and Company's mills were also sold during the year. This mill costs little over half the price of a Nahan mill, but is rather less efficient.

There are several new implements under trial on which reports will be submitted when duly tested.

D. CLOUSTON,

Deputy Director of Agriculture,

Central Provinces.

Report on demonstration work in Chhattisgarh Division.

1. The lines of demonstration work in hand during the year were :—

(i) The transplantation of rice.
(ii) The cultivation of groundnut.
(iii) The manuring of rice
(iv) The cultivation of sugarcane.

2. The health of the staff during the year was good; this I again attribute to the use made of quinine and mosquito nets.

3. Rice was transplanted under the supervision of our staff in 2,163 villages. Five agricultural assistants, six probationers and 25 kamdars were employed. Much assistance was given this year by the Land Record staff.

4. The services of 13 Revenue Inspectors and of the patwaris serving under them were obtained. The Revenue Inspectors were put in charge of circles where, with the help of our kamdars, they used their influence in pushing transplantation, under the supervision of the Divisional Superintendent of Agriculture. Some of the Tahsildars took a keen interest in this work and rendered the Department most valuable assistance. The area transplanted, as measured by the Land Record staff, was slightly over 16,000 acres as compared with 6,910 for last year. As some doubt had been cast on the accuracy with which our crop experiments have been carried out in previous years to compare the outturns of transplanted and broadcasted (*biasi*) rice in the villages, the Deputy Commissioner of Raipur suggested that these crop experiments should be conducted by the Sub-Divisional Officers this year as a check on the results of past years. To this we readily agreed. The comparative statement given below shows the outturns obtained from medium crops of transplanted and *biasi* rice, and also the outturns obtained from the best *biasi* plot and the best transplanted plot in each village :—

Village.	Outturn in lbs. per acre of		Increase due to transplantation.	Experiment conducted by
	Transplanted rice.	Biasi rice.		
1	2	3	4	5
	Acres.	Acres.	Acres.	
Ordinary plots.				
Mohringa	2,840	2,050	790	Mr. N. J. Roughton, I. C. S.
Murra	3,340	1,940	1,400	do.
Kolar	4,000	2,320	1,680	do.
Bangoli	2,240	2,030	210	do.
Khandwa	2,550	1,190	1,360	do.
Tarra	3,320	2,120	1,200	do.
Vinayakpur	2,580	2,040	540	Mr. Mandloi, Extra Assistant Commissioner.
Chengri	1,180	920	260	do.
Achoti	3,230	2,660	570	do.
Amdi	3,510	1,350	2,160	do.
Kathia	2,580	1,180	1,400	do.
Best plots				
Mohringa	3,700	2 160	1,540	Mr. Roughton, I. C. S.
Murra	4,220	1,700	2,520	do.
Kolar	4,500	2,920	1,580	do.
Jaroda	...	...	...	do.
Khandwa	5,360	2,200	3,160	Mr. Mandloi, Extra Assistant Commissioner.
Amdi	4,800	2,580	2,220	do.

5. The average increase due to transplantation according to this statement works out to 1,052 lbs. of paddy per acre worth at present prices Rs. 25 for average plots, and 2,204 lbs. worth Rs. 55 for the best plots. The average increase due to transplantation as obtained from the corresponding crop experiments carried out by our staff in co-operation with the malguzars concerned was 687 lbs. in 1909, 556 lbs. in 1910 and 693 lbs. in 1911, or an average of 645 lbs. per acre. Had the crop experiments of the present year been carried out by our own staff, I should have had good reason to doubt the accuracy of the figures: but as they were actully made by an Assistant and an Extra-Assistant Commissioner assisted by Rai Sahib Tundilal, Extra Assistant Director, the results are above suspicion.

6. We may take it that the yield of irrigated paddy can be increased by transplantation to the extent of at least one-third and that the average increase for a period of several years would be some way between 500 and 1,000 lbs. per acre. If we take even the lower figure which in terms of money is at present prices worth about Rs. 13, it follows that the Department has in this Division been the means of increasing the farming profits of rice cultivators by approximately Rs. 13 × 16,000 = Rs. 2,08,000 in one season. It has at the same time reduced the seed rate for the transplanted area from about 80 to 25 lbs. per acre; so that by transplanting 16,000 acres, 880,000 lbs. of paddy have been saved into the bargain.

7. The yield of 5,360 lbs. obtained in Khandwa village is, I believe, the highest on record for these Provinces by nearly 1,000 lbs.; but this is, easily understood when we take into consideration the fact that our method of transplanting single seedlings, which is entirely new to the very best rice-growers, is more productive than the existing method of planting bunches of from five to eight seedlings as practised in Balaghat, Chanda and Bhandara where rice cultivation is seen at its best, and which used to hold the record for high yields. Khan Sahib Israel Talabuddin, malguzar of this village, is to be congratulated on the excellent crop which he obtained over an area of over 120 acres of transplanted rice in this village. He reckons that by transplanting his area he now derives four times as much profit as he used to obtain five years ago, when he broadcasted his rice. The larger profits which he now makes enable him to treat his tenants more generously in many respects. It has enabled him, too, to purchase through the Department this year a herd of 20 superior cows, with which he is to start cattle breeding on improved lines.

8. With the view of widening the interest of leading cultivators in transplantation a batch of 22 cultivators from Raipur and Drug were taken by Rai Sahib Tundilal Powar, the Divisional Superintendent of Agriculture, to Balaghat, where they visited seven villages and where they discussed at length with the malguzars the outstanding features of rice cultivation in that district.

9. The rebate of four annas per acre on the water rate charged for transplanted areas sanctioned this year will, we believe, encourage cultivators in this Division to sign agreements and to irrigate their transplanted areas from the very beginning. Many cultivators, more especially those under Maroda and Khapri tanks in Drug, still pursue the short sighted policy of taking water as a last resource to save their crops.

Wheat Irrigation.—That cultivators are beginning to realise the advantage of irrigating wheat on a dry year like the present may be gathered from the fact that 655 acres of wheat were irrigated under the Government tanks in this Division during the year.

Groundnut.—The area under this crop continued to increase; it probably approached 1,000 acres in this Division in the year under report.

Sugarcane.—The area of sugarcane under the larger tanks is slowly increasing; till the larger canal projects are completed, from which water will be available even in dry years, there will not be much scope for the cultivation of this

crop. The areas planted under the different tanks this year are as shown below :—

Acres.				
18·00	...	...	...	Kusrangi tank
35·93	...	...	...	Pindraon „
24·67	...	...	...	Khapri „
9·70	...	...	...	Khola „
24·95	...	...	...	Kurud „
11·14	...	...	...	Maroda „
1·29	...	..	...	Hargahan „

34,706 canes were supplied for seed purposes to the cultivators under these tanks from the Raipur Farm.

The Manager of the Raipur Oil Mills to whom the Department supplied the small bone disintegrator last year has supplied 255 maunds of bone meal to customers during the year. The same gentleman supplied 3,012 maunds of cake manure to cane-growers in Chhattisgarh. This demand for cake as a cane manure is the direct result of the demonstration work carried out by the Department.

The farm staff and assistants employed on demonstration work in this Division have worked well. The work of Tejnath and V. Dyal is worthy of special mention. Ganeshram and D. N. Mukarjee have done very useful work as kamdars. The demonstration work has been very ably controlled by Rai Sahib Tundilal Powar who, as Divisional Superintendent, has displayed his wonted tact and energy.

The Department is much indebted to the keen and intelligent interest shown by Mr. Crawford, Deputy Commissioner of Drug, in every phase of demonstration work started in his district. Mohammed Ahmed, Tahsildar of Bemetara, and Krishna Sewak of Sainjari tahsil, did much to push transplantation in their respective tahsils.

D. CLOUSTON,

Deputy Director of Agriculture,

Central Provinces.

Report on Demonstration work in Nagpur Division.

There were 19 cotton seed farms in Wardha and 16 in Nagpur district, on all of which pure *rosea* cotton was grown. The reports sent in by 27 of the owners of these farms show that rosea yielded on an average 39 per cent of lint, while the ordinary *jari* grown by them gave 36·5 per cent only.

A reference is made in the report on Sindewahi Farm to the results obtained from trials of *buri*, *Cambodia* and *rosea* grown under irrigation in *wardi* soil.

On the strength of these results cultivators have been advised to sow *buri* on irrigable soil this year and a supply of seed for distribution has been stocked on the Sindewahi Farm.

2. Demonstration work was carried out under Ramtek tank in Nagpur, Khairbanda and Chandpur in Bhandara, and Ghorajheri and Asola-Mendha tanks in Chanda throughout the year. The crop in most of these areas is on the whole in a very fairly satisfactory condition. Under the Ghorajheri tank however the untimely breakdown of the irrigation water-supply in May had a serious effect on the cane over the whole area and has at the same time somewhat shaken the confidence of the cultivators. The cane area under Ramtek tank has risen to 255 acres, to 103 acres under the two Bhandara tanks and to 71 acres under Ghorajheri and Asola-Mendha tanks in Chanda. Cane was grown on a demonstration scale by the Department in five villages under Ramtek tank for the first time three years ago. It is being grown in 97 villages this year.

3. The Poona system of gur making was demonstrated at 10 different centres under Ramtek tank; at three under the Bandara tanks; and at 8 in Chanda. The working of the iron cane mills recommended by the Department was shown at the same time.

All the cane left over after planting had been completed under Ramtek tank was crushed and made into gur by the owners, working under the supervision of instructors supplied by our Department. This method of demonstration has enabled the Department to make known the advantages of using the Poona furnace in which no fuel other than the trash and *megass* of the cane dealt with is required. In all 20 Poona furnaces were constructed in this Division in the year under report. The Poona system of gur making and the use of Nahan and Burn and Company's sugarcane mills were demonstrated at Ramtek and Balaghat fairs and at a meeting of the Chanda Agricultural Association held on the Sindewahi Experimental Farm.

The experiments with cane mills go to show that the Nahan mill expresses from 70 to 73 per cent of juice in the case of thick cane and 63 to 66 per cent in the case of thin hard varieties. Burn and Company's mill gives from 2 to 3 per cent less juice in each case.

4. The thick varieties of cane grown were damaged to some extent by stem borer; Red Mauritius was much affected. Pundia again proved very susceptible to red rot. Striped and Ashy Mauritius are the most promising of the thick varieties. Thick cane, seed of which was supplied by the Department, is now being grown under the supervision of our staff in nearly 200 villages in this Division.

5. In Chanda the land intended for cane is manured by sheep-folding before planting and a top-dressing of cattle or sheep-dung is applied to the standing crop in the hot weather. Under the Bhandara and Ramtek tanks, the land is first manured with cattle-dung which is supplemented later by a top-dressing of cattle-dung or til cake applied in the hot weather.

As pointed out in last year's report, cake is an entirely new manure to cane-growers in these Provinces: 250 tons were supplied through the Department in the year under report to cultivators in this Division by the Raipur and Akola Oil Mills.

6. The cultivation of *gurmatia*, a late heavy yielding rice, continues to be pushed under Ramtek tank; 7,650 lbs. of seed of this variety were distributed this year. Transplantation with single seedlings was demonstrated during the rains in Chanda district; an area of 450 acres scattered over 42 villages was transplanted in this way in the year under report.

7. The cultivation of ground-nut is extending in Ramtek and Chanda. In the latter district both cane and ground-nut are at present grown under difficulties owing to the enormous number of wild pigs which frequent the jungles of the district.

8. The experiments carried out for the last three years with patent woven fencing have proved that type, No. 1150 is the best fence for general purposes. It debars both cattle and pig. Articles describing the advantages of this fence were written for the Indian Journal of Agriculture and Trade Journal: $1\frac{3}{4}$ miles of it were sold during the year to cultivators.

The Department is much indebted to Mr. Desmond, Executive Engineer, Nagpur, for valuable advice and assistance given by him from time to time.

D. CLOUSTON,

Deputy Director of Agriculture,

Central Provinces.

Report on Demonstration work in Berar.

Reference has been made in previous reports to the fact that the practice of steeping *juar* with copper-sulphate before sowing is now fairly common in Berar and requires no further demonstration. It is now stocked by *banias* in every leading village. A certain quantity is still supplied every year from the farm; 1,286 lbs. were given out in the year under report.

Seed farms.—All seed farms are now self-supporting. They are as far as possible supplied every year with pure selected seed from the Akola Farm, but as the maximum area that can be cropped with *rosea* on the farm is only 200 acres, it will be impossible to extend the seed-farm area sown with our own seed.

There were 90 seed farms in this Division last year comprising an area of 1,392 acres sown with *rosea* and 73 acres sown with *buri*. These supplied 331,051 lbs. of *rosea* seed this year. The owners of seed farms have sent in reports showing the outturns of *rosea kapas* and lint obtained as compared with district outturns. A summary of the information supplied is given below:—

Serial No.	Name of the District.	Percentage of lint to seed in		Outturn of *rosea* on seed farms as compared with the district outturn of *Jari* for the year.	
		Jari cotton.	*Rosea* cotton.	*Rosea.*	*Jari.*
				lbs.	lbs.
1	Akola ...	35·13	38·6	309	195
2	Buldana ...	33·00	37·18	366	190
3	Amraoti ...	35·93	39·61	468	263
4	Yeotmal ...	33·00	39·6	324	220
5	Wardha ...	35·34	39·00	473	220

The seed is being sold at from Rs. 40 to Rs. 60 per khandy of 640 lbs., the bazar rate being Rs. 20 per khandy.

To remove the difficulty experienced in ginning the *kapas* of these seed farms small ginning plants consisting of two or three gins driven by an oil engine are recommended for the use of the owners. Eleven plants have already been set up: should these prove satisfactory in all respects this method of ginning the kapas of seed farms will be adopted by many more cotton-seed growers.

The outturn of *buri* cotton was comparatively poor this year owing to the short rainfall.

Agricultural Associations.—The Agricultural Associations in Berar are working hand in hand with the Department in propagating and distributing selected cotton-seed, through the agency of seed farms, and in the sale of agricultural implements. The following honorary agents for the sale of turn-wrest ploughs were appointed during the year:—

(1) Mr. Habibullah Khan, Pleader, Burhanpur, for Kusumkot, circle Dharni.

(2) Mr. Mahadeorao Honade, Pulgaon, District Wardha.

(3) Mr. P. R. Deshpande, Sindi, District Wardha.

(4) Mr. Anandrao Meghe of Borgaon, District Wardha.

(5) Mr. B. R. Landge, Yeotmal.

(6) Mr. Eshwardas of Ukhli.

(7) Mr. Ghulam Mohammed of Hinganghat.

There are 15 of these agents in all.

All the four district Agricultural Associations of Berar now pay an annual subscription of Re. 1 per member. Part of the money is to be utilized every year in giving prizes for the best exhibits of cotton, *juar* and ground-nut sent te the Divisional meeting.

Divisional meeting.—The Berar Divisional meeting held this year was the first of its kind in these Provinces to be attended by the Hon'ble the Chief Commissioner. Arrangements were made to make it as instructive as possible. A large display of agricultural machinery was shown at work. A *resume* of the lessons learnt up to date from the different lines of experimental work in progress was printed on large labels, which were set up in the experimental series concerned. Three Sub-Committees, the members of which were mostly drawn from the Agricultural Associations, sat on the day previous to the meeting to consider the following subjects:—

Committee A.—To consider (i) the advisability of starting Association Seed Farms on the lines suggested in Mr. Standen's note; (ii) the extent to which they could be made to take the place of existing seed farms; and (iii) whether in the event of co-operative seed farms like that started in Gaigaon being opened, Association Farms would still be necessary.

Committee B.—To examine and report on the existing organization for the introduction, supply and repair of improved agricultural implements and machinery in Berar and to make recommendations for future guidance.

Committee C.—To report on exhibits of cotton, *juar* and ground-nut.

The findings of the Committees were as follows:—

Committee A.—The Committee, after a perusal of the papers, proceeded to discuss the question before them. Messrs. Standen, Crosthwaite, Low and Clouston put forward their views, and after further discussion it was agreed (1) that it was possible at once to start one or more Co-operative Unions, controlling each some 500 or more acres under improved cotton-seed. These Unions should subscribe for and employ a Kamdar by a levy of a premium at 1½ to 2 annas per acre. The Kamdar would be trained by the Agricultural Department in cotton cultivation and selection, and in the management of ploughs, gins and oil engines. The Kamdars would work under the immediate orders of the Co-operative Union and their work would be supervised by the Agricultural Department, by whose advice the Union would be bound on technical matters. Messrs. Pethe, Landge and Kulkarni stated that such Unions could be started in their neighbourhood.

(2) The Agricultural Department agrees to supply the seed to approved Unions in preference to any other purchasers. As these Unions increase in number and size, they will control an area vastly in excess of the 5,000 acres that the Agricultural Farm could supply with improved cotton-seed. It is therefore desirable that the seed distribution from the Government Farm should be concentrated in compact areas carefully managed and inspected, from which reliable seed would be available for the remaining Unions.

(3) The Committee are of opinion that the establishment of a limited liability society is likely to detract from the number of workers and the energy and the interest available to push on the dissemination of improved seed by co-operative methods; and believing as they do that co-operative credit is

destined to be the future link between the Agricultural Department and the public, they would be averse from any step that would be likely to prejudice its success. It is unnecessary to await the creation of Co-operative Credit Societies in order to start co-operative seed distribution unions; but much help, financial and administrative, is to be expected from a well organized co-operative credit organization; and the Committee agree that, owing to the backward state of co-operative credit in Berar at present, some delay is likely to result in the extension of co-operative seed unions, and they therefore recommend that Government should adopt such measures as seem advisable to push on co-operative credit in Berar as rapidly as possible.

Committee B.—It was resolved that the best method of supplying agricultural implements is that the Agricultural Department should give a business reference to local agents; Messrs. Burn and Company should send to each local agent half a dozen ploughs; the local agent should order fresh ploughs when four or five were sold, and such orders should be made through the Department: payments should be made directly by the local agent to Messrs. Burn and Company If Messrs. Burn and Company were satisfied with the promptitude in payment they should supply them directly, but if they were not satisfied they should report to the Department who would make enquiries through its own staff. Similarly if no ploughs were sold for a long time by any particular local agent, Messrs. Burn and Company would draw the attention of the Department to the fact.

Spare parts.—Messrs. Burn and Company, as represented by Mr. Macfarlane, agree to keep at the Akola Farm a stock of all the spares likely to be needed. The list of spares read out by Mr. Macfarlane appears satisfactory.

For ploughs the Farm can also take a part from any plough in stock.

For the Harder fodder cutter and other machines not got from Burn and Company the Farm will keep spare parts in stock.

Staff.—There is now one man trained by Messrs. Burn and Company for setting up oil engines in the Provinces. Two others will be engaged by the Department. They will visit engines to do repairs and to make periodical inspections, no fee being charged for the present.

Committee C.—Awarded the prizes as follows:—

Rosea Cotton.

		Rs.
1. Mr. Nandram Shivanath, Marwari, of Dadi, tahsil Amraoti	1st prize ...	50
2. Mr. Baliram Moreshwar, Moharrir, of Kandli, tahsil Ellichpur	2nd prize ..	20
3. Nilkantrao Deshmukh of Verool, district Wardha.	3rd prize ...	10
4. Mr. Harlal Shevaram, Marwadi, of Kokarda, district Amraoti		

Buri Cotton.

1. Mr. Baloba Bahmanji, seed farmer, Gowardhan ..	1st prize ...	20
2. Mr. Kanhyalal Ramkisen Pethe, of Morsi ...	2nd prize...	10
3. Mr. Janrao Bajirao Deshmukh, of Shirala, tahsil Amraoti.	3rd prize...	5

Juars.

1. Mr. Gulam Ahmad Khan, of Pimpalgaon-Raja, tahsil Malkapur	1st prize ...	20
2. Mr. B. R. Landge of Sonwadhona ...	2nd prize...	10

Ground-nut.

		Rs.
1. Mr. Gulam Ahmad Khan, of Pimpalgaon-Raja ...	1st prize ...	20
2. Gopal Shridar Deshpande, of Chikhli, district Buldana	2nd prize...	10

Agricultural Unions.—Three Agricultural Unions were registered during the year, one in Yeotmal District and two in Akola District. For the present these Unions will undertake to propagate and distribute *rosea* cotton seed and to sell turn-wrest ploughs and Akola hoes. A set of rules for their guidance has been drawn up.

Medals and Sanads for good work done in Agriculture were granted to the persons named below. These were given out at the Divisional meeting by the Hon'ble the Chief Commissioner:—

Medals—

(1) Mr. V. G. Kulkarni, of Gaigaon.

(2) Mr. Gulam Ahmed Khan, of Pimpalgaon-Raja.

Sanads—

(1) Mr. Ramji Yeduji Patil, of Bori-Adegaon.

(2) Mr. Manikrao Deshmukh, of Matergaon.

(3) Mr. Ganpat Patil, of Alegaon.

(4) Mr. Prithiramsingh, of Pathrot.

(5) Ganpat Sitaram Maulvi, of Yeotmal.

Damage by wild animals.—Having heard of the success obtained by the Department in capturing 35 wild cattle in Sagoda reserve last year, the cultivators of Sirpur sent an application requesting assistance in capturing a herd which had taken up its abode in Pangarkheda jungle from which it made nightly raids on the crops of adjoining villages. A small *kheda* 40 feet square and 7 feet high was constructed in the jungle. Into this a supply of cotton seed and some green juar stalks and salt were placed. The cattle having been induced to enter at night the gate was closed by a watchman. The animals were then lassoed one by one by our men from trees overhead. Of the 16 animals captured only one died. This method is much more efficient than that followed in the case of cattle caught at Sagoda, and will, therefore, be adopted as the standard method for future operations.

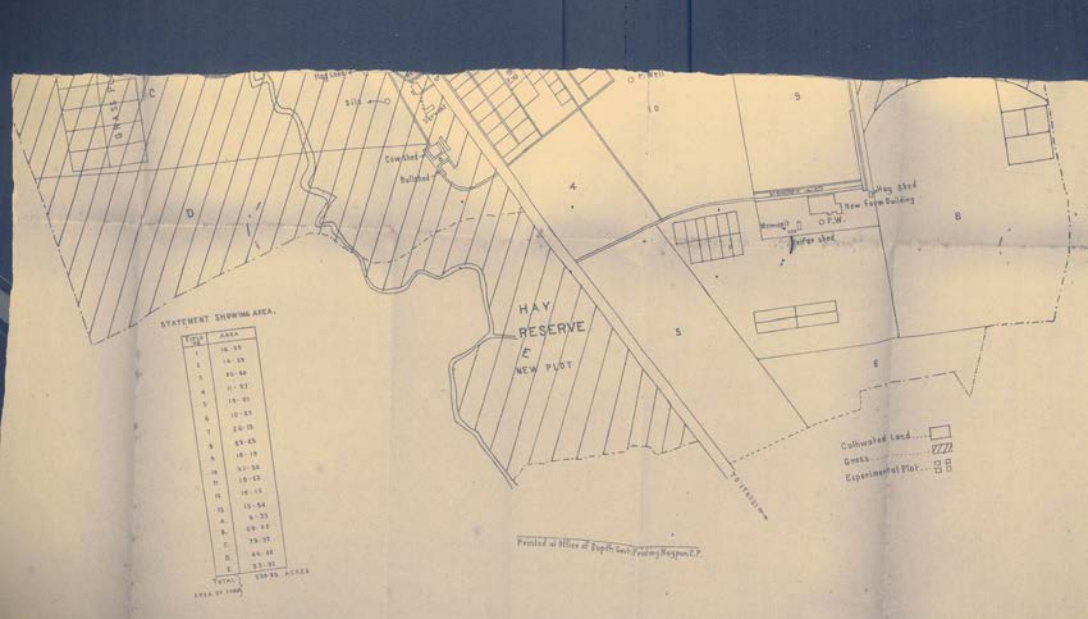
The Department is much indebted to Major Plowden for the interest he has shown in the Akola Farm, and for the assistance which he has given our staff during the year.

D. CLOUSTON,

Deputy Director of Agriculture,

Central Provinces.

SURVEY PLAN
OF
GOVERNMENT FARM
AT
PAWARKHERA
DIST. HOSHANGABAD
Scale 20 in 1 Inch
RESERVE
Cattle Segregation Rail
Enclosed Fields
Tank
Well
Road
O.P. Well
Hay Shed
New Farm Building
O.P.W.
Water shed
TRAINING AREA


HAY RESERVE E NEW PLOT
Cow Shed
Bullshed
Hay shed
New Farm Building
P.W.
Cultivated Land
Grass
Experimental Plot
STATEMENT SHEWING AREA.
Printed at Office of Supdt. Govt. Printing Nagpur C.P.

Annual Report on the Government Agricultural Station, Powarkhera (Hoshangabad), for the year 1912-13, by G. Evans, Esq., M. A., Deputy Director of Agriculture, Northern Circle, Jubbulpore, Central Provinces.

I.—General.

This station was opened in 1903, but owing to the unsuitability of part of land originally acquired for experimental purposes, the area was extended in 1906, so as to include a piece of level black land to the south, typical of the wheat soil of this part of the Nerbudda valley. In 1912 a further area of 34·19 acres of inferior land much cut up by nallahs was acquired and was put down to grass as the grazing area was insufficient. The Cattle Breeding Farm adjoins the Experimental Farm proper and the whole forms a compact block of 520·76 acres which is made up as follows :—

	Acres.
Arable land	250·74
Grazing area	197·19
Grass reserve	65·36
Roads and buildings	7·47
Total ...	520·76

Part of the grass reserve has gradually become infested with coarse grasses and bushes and has consequently been thrown open to grazing and a corresponding area of the grazing land has been enclosed for hay.

Situation.

This Farm is situated close to the small village of Powarkhera in the Tahsil and District of Hoshangabad. It is bisected by the high road which connects Itarsi with Hoshangabad, being seven miles from the former and four miles from the latter town. The nearest railway station is Byaora on the Indian Midland Section of the Great Indian Peninsula Railway which is two miles from the Farm by metalled road. The land is fairly representative of the black wheat soils of the Nerbudda valley.

The soil consists of two kinds of black wheat land differing only in degree and known as maryar and morand II, respectively. The latter is of lighter texture and can grow kharif crops. An analysis of a sample of the former soil, made by Mr. F. J. Plymen, the Agricultural Chemist, is given below. In places it is more than 13 feet deep.

Analysis of maryar soil from Powarkhera :—

	Acres.
Coarse sand	3·78
Fine sand	9·43
Silt	16·78
Fine silt	21·50
Clay	34·00
Loss on ignition	6·20
Moisture	5·10
Calc. Carbonate	1·05
Soluble in dilute acid	2·16
Total ...	100·00

The main crops of the District are rabi, and the Farm is primarily intended for experiments with wheat and other winter crops.

DAMAGE BY WILD ANIMALS.

The crops in this neighbourhood are very liable to damage by wild animals. Wild pig come down from the hills at the end of the rains and abound until wheat harvest. In spite of constant watching it is almost impossible to keep them away from such crops as cane and ground-nuts, which are particularly relished, and are only sparingly grown in the neighbourhood.

Antelope are not so common as formerly and do comparatively little harm, but parrots, coolan and geese cause much injury at times to the grain crops.

IMPROVEMENTS.

The bunds constructed to prevent erosion are working satisfactorily and are rapidly changing for the better the field so protected.

Twenty acres of land were turn-wrested during the cold and hot weather and the results are extremely satisfactory, deep-rooted grasses and weeds being completely eradicated and a good tilth obtained.

CLIMATE.

The climate on the whole is more agreeable than in the south of the Provinces. The Nerbudda valley is here about 1,000 feet above the sea level and although frosts are rare, the hot weather is by no means a long one.

The following table represents the temperatures determined at Hoshangabad by the Jail authorities:—

Month.	Average maximum.	Average minimum.	Absolute maximum.	Absolute minimum.
1	2	3	4	5
January	80·3	52·3	91·0	40·0
May	107·6	80·3	117·1	60·5
July	86·7	72·2	106·4	70·0

CHARACTER OF THE SEASON.

The total rainfall during the year amounted to 46·99 inches, the average on the Farm for the last eight years being 38·82 inches.

The season was essentially a rabi one and record crops were obtained.

The monsoon was late in arrival and did not really set in until the second week of July. Kharif sowings were completed by the 12th of that month. Germination was only moderate and growth poor at the commencement. Continuous rain followed for several weeks and cotton crop made little progress, as no bullock hoeings could be given. A break at the end of August improved matters, but the kharif crop as a whole was not a good one. Maghai til was injured by heavy rain and only a moderate crop resulted. There was a long break from 8th to 24th September which allowed the rabi land to be thoroughly cultivated, and

good showers at the end of that month ensured a moist seed bed. Rabi sowings were completed in good time. The extraordinary rainfall of nearly 4 inches in the third week of November on the whole benefited the young wheat crop and it made wonderful growth on the lighter soils, while it caused a certain amount of damage in the flat maryar fields, some of which was late sown owing to delay caused by an outbreak of the disease among the plough bullocks. There was no rainfall at Christmas, and this tract escaped the heavy February rains experienced in the east of the Province and consequently the wheat crop on the heavy lands also recovered and eventually yielded well.

RAINFALL.

The following table compares the rainfall with the average of last eight years :—

Month.		Number of rainy days.	Rainfall during 1912-13.	Average rainfall of last eight years.	Remarks.
1		2	3	4	5
				Inches.	
June 1912	1st half	...	...	0·86	
	2nd half	3	1·40	3·86	
July 1912	1st half	8	2·52	6·90	
	2nd half	10	18·27	6·13	
August 1912	1st half	11	11·23	6·14	
	2nd half	4	2·87	4·92	
September 1912	1st half	3	1·01	5·09	
	2nd half	3	3·44	3·13	
October 1912	1st half	...	...	0·18	
	2nd half	...	...	0·01	
November 1912	1st half	...	...	0·25	
	2nd half	2	3·92	0·33	
December 1912	1st half	...	0·08	0·09	
	2nd half	...	...	0·15	
January 1913	1st half	...	...	0·09	
	2nd half	...	...	...	
February 1913	1st half	1	0·15	0·20	
	2nd half	...	0·09	0·07	
March 1913	1st half	...	0·04	0·02	
	2nd half	...	...	0·16	
April 1913	1st half	...	...	0·14	
	2nd half	...	...	...	
May 1913	1st half	1	0·14	...	
	2nd half	1	1·83	0·10	
	Total	47	46·99	38·82	

STAFF.

The Farm was in charge of Mr. Govind Prasad throughout the year. After one or two preliminary mistakes his work improved considerably and he will, I hope, become a capable Farm Superintendent. T. K. Ghatpande, the first Overseer, worked hard and appears to be a thoroughly reliable man.

VISITORS.

The Farm was visited by a number of distinguished visitors, among them being the Hon'ble the Chief Commissioner, Sir Benjamin Robertson, K. C. S. I., C. I. E,, I. C. S., His Highness the Heir-Apparent of Bhopal, the Commissioner, Nerbudda Division, the Political Agent, Bhopal, etc.

The Divisional meeting which was held in March was well attended and besides the persons who came then some 300 persons visited the Farm at different times during the year.

II.—Experimental Series.

SERIES A.—To test the effect of different manures on wheat grown continuously with irrigation.

Variety of wheat.—Sukerhai pissi, area '20 acre each plot.

No. of plot.	Treatment.	Outturn per acre 1912-13. Grain.	Outturn per acre 1912-13. Other.	Cost of cultivation per acre.	Value realized per acre.	Profit per acre.	Remarks.
1	2	3	4	5	6	7	8
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	Unmanured	992	1,157	14 6 10	45 7 9	31 0 11	
2	Saltpetre = 20 lbs. Nitrogen per acre top-dressed.	1,079	1,062	29 8 11	48 7 5	18 14 6	
3	Ammonium Sulphate = 20 lbs. Nitrogen per acre mixed with seed before sowing.	1,176	1,125	26 2 4	52 10 9	26 8 5	¾ plot was irrigated.
4	Oil cake = 20 lbs Nitrogen per acre, ground fine and applied in rains.	1,019	1,225	27 4 8	46 14 0	19 9 4	¾th irrigated.
5	Farm yard manure = 20 lbs Nitrogen per acre, applied in the beginning of rains.	1,217	1,145	18 13 8	54 6 11	35 9 3	do.
6	Mahua refuse applied in the beginning of rains.	1,150	1,045	17 15 6	51 3 7	33 4 1	A small portion could not be irrigated.
7	Green-soiled with Sann 100 lbs. seed sown per acre.	1,150	1,260	21 6 11	52 4 9	30 13 10	
8	Green-soiled with Tarota (cassia) 100 maunds per acre.	1,270	1,167	20 9 7	56 10 1	36 0 6	

This series had been laid out on a fresh piece of level maryar land. Owing to certain difficulties connected with the head of water raised by the oil engine from the big well it was not found possible to irrigate all the plots. On account of the heavy rainfall in November the first irrigation was not given, and the second irrigation in the second week of January was not really required. All organic manures did well with the exception of oil cake, the heavy rainfall in November causing complete decomposition. Sann-hemp owing to late sowings and subsequent continuous heavy rainfall made poor growth and the bulk when ploughed in was very small. Tarota is a common weed on waste land and was cut and carted on to the land and then ploughed in at the same time as the sann.

N. B.—The oil cake used was til cake pressed in a Deshi mill and containing a high percentage of oil, the presence of which probably retarded decomposition in the soil.

SERIES E.—Effect of rotation with wheat as the principal crop.

Area—·20 acre each plot.

Variety—*Sukerhai Pissi.*

Number of plot.	Treatment.	Outturn per acre. 1909-10. Crop.	Grain.	Other.	1910-11. Crop.	Grain.	Other.	1911-12. Crop.	Grain.	Other.	1912-13. Crop.	Grain.	Other.	Cost of cultivation per acre.	Value realized per acre.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			lbs.	lbs.		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	Light dressing of farm yard manure 40 lbs. Nitrogen per acre every third year when wheat is grown.	Wheat ...	586	781	Wheat ...	850	808	Wheat ...	1,137	1,300	Wheat ...	1,334	1,310	20 12 1	59 14 4
2		Gram ...	930	854	Wheat ...	1,045	923	Gram ...	895	827	Wheat ...	1,497	1,707	21 0 8	63 7 8
3		Wheat ...	485	788	Gram ...	780	790	Wheat ...	1,137	1,397	Gram ...	1,095	1,020	9 7 3	41 9
4		Teora ...	323	738	Wheat ...	990	855	Teora ...	1,195	1,187	Wheat ...	1,472	1,710	20 15 10	67 7 2
5		Wheat ...	580	838	Teora ...	840	1,358	Wheat ...	1,350	1,567	Teora ...	1,365	1,497	7 11 9	41 9 9
6		Wheat ...	495	873	Wheat ...	760	870	Wheat ...	815	1,402	Wheat ...	1,046	1,187	10 1 8	52 4 5
		Gram ...	159		Gram ...	113		Gram ...	270		Gram ...	135			
7		Rabi Til ...	178	...	Wheat ...	865	820	Linseed ...	170	725	Wheat ...	1,220	1,365	20 9 7	55 10 0
8		Wheat ...	693	888	Linseed ...	475	945	Wheat ...	1,060	1,160	Linseed ...	570	957	7 14 3	48 10 1
9		Urid ...	...	...	Wheat ...	775	775	Masur ...	185	422	Wheat ...	1,272	1,337	20 10 10	57 9 4
10		Wheat ...	615	845	Masur ...	130	408	Wheat ...	1,280	1,555	Masur ...	967	1,167	7 12 4	38 1 5
11		Wheat ...	535	850	Wheat ...	650	770	Wheat ...	1,050	1,565	Wheat ...	815	1,060	10 10 0	43 7 6
		Linseed ...	48		Linseed ...	150		Linseed ...	10		Gram ...	167			

Plots 7 and 9 were included in this series only two years ago, and still have a certain amount of kans grass present which affects the yield. Wheat rotated with a pulse crop has given good results, but owing to the inferior value of the pulse crops grown in the alternate years, it appears that with good cultivation, wheat every year will pay best.

SERIES H.—Effect on wheat grown continuously of different quantities of seed, and different methods of sowing.

Variety.—Sukerhai Pissi. Area.—·40 acre.

No. of plot.	Treatment.	Outturn per acre. 1910-11. Grain.	Other.	1911-12. Grain.	Other.	1912-13. Grain.	Other.	Cost of cultivation per acre.	Value realized per acre.
1	2	3	4	5	6	7	8	9	10
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
1	80 lbs. seed per acre. Sown with country plough.	650	685	515	567	924	855	9 12 0	41 3 6
2	100 lbs. seed per acre. Sown with country plough.	690	668	434	557	940	873	10 9 2	42 3 7
3	80 lbs. seed per acre. Sown with Tiffan.	651	665	544	601	974	954	9 5 7	43 10 3
4	100 lbs. seed per acre. Sown with Tiffan.	660	665	505	591	920	903	10 1 3	41 4 11

Owing to the good condition of the seed-bed and the presence of sufficient moisture near the surface, the Tiffan has given this year as good results as the Nari plough which sows the seed deeper. The Tiffan is a heavy implement and much time is lost in turning it at the end of each line, and consequently in a big field less time would be taken in sowing than with the Nari plough, and expenses would be lessened proportionately.

SERIES M.-(*a*), AND M.-(*b*).—Effect of different manures on cotton grown in rotation with Juar and Tur and sown with drill and broadcast. Manure to be applied only in the year in which cotton is grown. Area.—·20 acre each plot.

M.-(*a*) 1. Unmanured.
2. Farm yard manure=40 lbs. Nitrogen per acre, applied before sowing
3. Farm yard manure=20 lbs. Nitrogen per acre applied before sowing.
4. Nitre=10 lbs. Nitrogen per acre, applied as top-dressing before hoeing.
5. Nitre=5 lbs. Nitrogen per acre, and ammonium sulphate 10 lbs. Nitrogen per acre, the former top-dressed and the latter drilled.
6. Ammonium sulphate=20lbs. Nitrogen per acre, drilled in with seed.

M.-(*b*). Same as above [M.-(*a*)] but seed sown broadcast.

No. of plot.	Crop.	M.a—Sown with drill.						M.b—Sown broadcast.					
		Average of cotton for past four years.	1911-12.		1912-13.			Average of cotton for past four years.	1911-12.		Outturn of cotton during 1912-13.	Cost of cultivation per acre.	Value realized per acre.
			Grain.	Other.	Outturn of cotton per acre.	Cost of cultivation per acre.	Value realized per acre.		Grain.	Other.			
1	Cotton	345	...	...	525	Rs. a. p. 16 11 1	Rs. a. p. 52 8 0	390	...	...	562	Rs. a. p. 13 13 4	Rs. a. p. 36 4 0
	Juar	...	485	2,900	...	...	...	...	362	2,057	...	...	...
	Tur	...	78	388	...	...	...	...	247	420	...	...	...
2	Cotton	445	...	...	662	27 7 2	66 4 0	401	...	...	517	24 12 3	51 12 0
	Juar	...	780	3,987	...	...	...	...	410	1,985	...	...	...
	Tur	...	85	830	...	...	...	...	182	332	...	...	...
3	Cotton	365	...	...	597	22 2 2	59 12 0	378	...	...	442	19 4 9	44 4 0
	Juar	...	797	3,760	...	...	...	...	605	2,575	...	...	...
	Tur	...	95	226	...	...	...	...	150	350	...	...	...
4	Cotton	477	...	...	600	25 12 1	60 0 0	418	...	...	333	21 24 10	33 4 0
	Juar	...	630	3,150	...	...	...	...	487	1,923	...	...	...
	Tur	...	122	315	...	...	...	...	137	997	...	...	...
5	Cotton	484	...	...	654	28 1 7	65 0 0	463	...	...	425	24 9 4	42 8 0
	Juar	...	640	2,650	...	...	...	...	460	2,352	...	...	...
	Tur	...	803	417	...	...	...	...	180	385	...	...	...
6	Cotton	415	...	...	671	29 5 2	67 2 0	372	...	...	432	25 12 8	43 4 0
	Juar	...	687	2,790	...	...	...	...	645	530	...	...	...
	Tur	...	130	377	...	...	...	...	167	407	...	...	...

Plots 4 and 5 in both series received Nitre at 10 lbs. and 5 lbs. Nitrogen per acre, respectively, on account of shortage of saltpetre.

The seedlings in the drilled series suffered from excess of moisture in the furrow to start with, but after the first bullock hoeing, the drilled crop did far better than the series which was sown broadcast and consequently coud be hand-weeded.

The drilled series owing to continuous heavy rain had to be hand-weeded first, as the land was too wet for the bullock-hoe, and consequently the cost of cultivation was considerably increased. The drilled crop have given, however, a considerably better crop than the broadcast crop.

Ammonium sulphate alone, and with a small quantity of saltpetre has given promising results.

SERIES N.—Rotation experiments with kharif crops.

Area=·20 acre each plot.

No. of plot.	Treatment.	Crop.	Outturn per acre. 1909-10. Grain.	1909-10. Other.	1910-11. Grain.	1910-11. Other.	1911-12. Grain.	1911-12. Other.	1912-13. Grain.	1912-13. Other.	Cost of cultivation per acre.	Value realized per acre.
1	2	3	4	5	6	7	8	9	10	11	12	13
			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	To be manured with farm yard manure 40 lbs. Nitrogen per acre every other year (except in plot No. 4) in which cotton is sown.	Cotton ...	230	...	65	...	65	...	197	...	...	...
		Tur ...	371	354	540	815	300	577	350	480	16 10 3	30 14 4
2		Cotton ...	...	...	50	...	...	...	352	...	...	...
		Tur ...	...	...	665	950	...	...	315	466	26 5 8	45 7 3
		Juar ...	1,431	6,989	...	...	680	4,365	...	...	...	...
3		Tur ...	...	...	835	1,025	...	...	277	492	26 12 4	50 10 4
		Cotton ...	...	...	35	...	...	...	412	...	...	...
		Juar ...	1,200	8,565	...	...	810	4,360	...	...	...	...
		Urid ...	3	6	...	...	5	7	...	...	...	...
4		Cotton ...	...	...	93	...	...	...	557	...	16 13 3	55 12 0
		Juar ...	1,135	6,145	...	...	770	3,355	...	...	...	...
5		Cotton ...	...	...	92	...	...	...	736	...	27 15 1	73 10 0
		Juar ...	1,362	7,308	...	...	975	3,867	...	...	...	...
6		Cotton ...	...	...	158	...	..	...	399	...	27 15 11	39 14 0
		Sann ...	Failed.	...		...	150 Seed.	210 Fibre.	...	...	...	...
7		Cotton ...	...	...	95	...	...	...	320	...	23 8 3	32 0 0
		Wheat ...	500	495	...	...	520	590	...	...	...	...
8		Cotton ...	...	...	118	...	...	...	407	...	24 8 6	40 12 0
		Gram ...	620	580	...		540	510	...	...	...	...
9		Cotton ...	...	...	93	...	...	...	409	...	24 5 7	40 14 0
		Wheat ...	43	638	...	...	327	545	...	...	...	...
		Gram ...	325				150					
10		Cotton ...	...	...	148	...	...	...	415	...	24 6 5	41 8 0
		Tur ...	88	173	...	...	135	225	...	...	...	...
		Rabi Til ...	254				202	410	...	...	...	...

Sann hemp in plot 6 last year practically failed.

SERIES S.—To test the quantity of water required for rabi in black soil with different methods of irrigation. Wheat in rotation with gram.

Area—·50 acre each plot.

No. of plot.	Treatment.	Outturn per acre.												Cost of cultivation per acre.	Value realized per acre.
		1908-09.				1910-11.				1912-13.					
		Quantity of water per acre.	Crop.	Grain.	Other.	Quantity of water per acre.	Crop.	Grain.	Other.	Quantity of water per acre.	Crop.	Grain.	Other.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Gallons.	lbs.	lbs.	lbs.	Gallons.	lbs.	lbs.	lbs.	Gallons.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	Broad irrigation.	78,940	Gram.	938	867	67,690	Gram.	840	1,030	26,000	Gram.	1,343	1,277	16 0 6	51 2 5
2	Kiari do. ...	55,580	,,	807	693	61,440	,,	1,020	1,020	24,000	,,	1,491	1,304	17 4 0	56 2 8
3	Long-beds do.	61,040	,,	775	777	63,000	,,	860	960	22,378	,,	1,243	1,059	16 0 9	45 11 7

The size of the plots was increased from ·10 to ·50 last year.

Only one irrigation was given and that was probably not really required.

SERIES T.—To ascertain what quantity of water is most economical for the irrigation of wheat grown continuously on black soil.

Crop.—*Sukerhai Pissi.* Soil.—Morand I.

No. of plot.	Treatment, 1910-11.					Treatment 1911-12.					Treatment, 1912-13.						
	Date of irrigation.	Quantity of water in cubic feet per acre.	Outturn per acre.		Profit per acre.	Date of irrigation.	Quantity of water in cubic feet per acre.	Outturn per acre.		Profit per acre.	Date of irrigation.	Quantity of water in cubic feet per acre.	Outturn per acre.		Cost of cultivation per acre.	Value realized per acre.	Profit per acre.
			Grain.	Other.				Grain.	Other.				Grain.	Other.			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
			Lbs.	Lbs.	Rs. a. p.			Lbs.	Lbs.	Rs. a. p.			lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	No irrigation	...	446	434	11 7 0	No irrigation	...	468	516	8 14 4	No irrigation	...	631	626	9 5 8	38 5 10	19 0 2
2	1st December 1910	6,000	711	698	21 15 0	Do.	...	540	580	9 0 0	Do.	...	9681	736	9 7 0	30 14 8	21 7 8
3	Do.	6,000	946	944	31 0 0	Do.	...	714	805	12 10 4	Do.	...	*708	786	13 7 8	32 3 9	19 12 1
	1st January 1911	4,000				1st January 1911	4,000				1st January 1913	1,000					
4	1st December 1910	6,000	1,025	1,120	35 4 8	No irrigation	...	780	1,062	12 12 0	No irrigation	1,000	1,018	1,138	13 7 8	46 6 6	32 14 10
	1st February 1911	4,000				1st February 1913	4,000				1st February 1913						
5	1st December 1910	6,000				No irrigation	...				No irrigation	...					
	1st January 1911	4,000	1,130	1,350	38 8 8	1st January 1912	4,000	830	1,004	16 3 0	1st January 1913	1,000	1,018	1,016	16 3 8	45 12 2	29 8 6
	1st February 1911	4,000				1st February 1913	4,000				1st February 1913						
6	1st December 1910	12,000	978	1,114	34 5 5	No irrigation	...	752	1,048	9 5 4	No irrigation	...	856	1,001	9 11 4	39 4 2	29 8 10
7	Do.	12,000	1,160	1,072	39 15 0	Do.	...	850	852	12 13 8	Do.	1,000	932	1,008	12 11 0	44 11 6	32 0 6
	1st January 1911	4,000				1st January 1912	4,000				1st January 1913						
8	1st December 1910	12,000	1,089	946	33 11 0	No irrigation	...	780	848	12 12 0	No irrigation	1,000	870	904	13 6 4	39 5 1	25 14 9
	1st February 1911	4,000				1st February 1913	4,000				1st February 1913						
9	1st December 1910	12,000				No irrigation	...				No irrigation	...					
	1st January 1911	4,000	884	826	26 3 8	1st January 1912	4,000	704	758	16 1 8	1st January 1913	1,000	850	870	15 15 4	38 5 8	22 6 4
	1st February 1911	4,000				1st February 1913	4,000				1st February 1913	1,000					
10	Irrigation when required.	...	664	816	19 4 4	No irrigation	...	576	504	8 15 0	No irrigation	...	649	740	9 9 0	29 10 4	20 1 4

* A certain amount of damage by hares.

† The level is higher and the whole plot cannot be irrigated. Also some damage by hares.

Plots 1 and 10 are somewhat poor and uneven. In a year of heavy winter rainfall like the one under report results of irrigation experiments are largely at a discount.

HAY MANURIAL EXPERIMENTS.

To investigate the Manurial requirements of Hay.

Area of each plot—·25 acre.

No. of plot.	Treatment.	Date of manuring.	Outturn per acre, 1908-09.		Outturn per acre, 1909-10.		Outturn per acre, 1910-11.		Outturn per acre, 1911-12.		Outturn per acre, 1912-13.	
			Hay.	Other.	Hay.	Other.	Hay.	Other.	Hay.	Other.	Hay.	Other.
1	2	3	4	5	6	7	8	9	10	11	12	13
			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	Unmanured ..	...	2,000	20	2,592	44	2,740	...	2,548	...	794	...
2	Superphosphate 250 lbs...	15th July 1909.	2,432	64	3,054	16	3,520	...	4,704	...	1,268	...
3	Basic slag 187½ lbs. ...	Do. ...	2,240	100	3,056	48	2,732	...	3,020	...	824	...
4	Superphosphate 166⅔ lbs.	Do. ..	2,220	80	4,220	68	3,372	...	3,740	...	1,156	...
5	Superphosphate 166⅔ lbs.	Do. ..	...	...	...	...	...	...	...	...	...	...
	Potassium Sulphate 25 lbs.	Do. ..	2,116	48	4,824	60	3,328	...	4,140	...	1,250	—
6	Ammonium Sulphate 25 lbs.	19th August 1911.	2,784	48	4,880	4	3,232	...	2,144	...	1,258	...
7	Sodium Nitrate 33⅓ lbs.	Do. ..	2,436	20	4,504	24	3,000	...	3,760	...	1,188	...
8	Superphosphate 41⅔ lbs.	Do. ...	2,448	48	4,696	52	2,856	...	3,888	...	1,066	...
9	Superphosphate 41⅔ lbs.	...	...	...	...	...	...	...	...	...	...	...
	Sulphate of Potash 10 lbs.	19th August 1911.	2,160	52	4,888	60	2,908	...	4,700	...	1,012	...
10	Superphosphate 41⅔ lbs.	...	...	...	...	...	...	...	...	...	...	...
	Ammonium Sulphate 25 lbs.	19th August 1911.	3,000	48	6,008	28	3,728	...	3,336	...	1,912	...
11	Superphosphate 41⅔ lbs.	...	...	...	...	...	...	...	...	...	...	...
	Ammonium Sulphate 25 lbs.	...	...	...	...	...	...	...	...	...	...	...
	Sulphate of Potash ...	19th August 1911.	2,652	72	5,820	24	3,984	...	4,816	...	1,536	...
12	Farm yard manure ¾ ton.	5th June 1911.	1,804	80	3,612	24	2,428	...	3,068	...	1,146	...

Owing to the late arrival of the monsoon the hay crop on the Farm was a very poor one.

III.—VARIETIES OF CROPS.

A.—Kharif crops.

Cotton.—In spite of the unfavourable early part of the season and the consequent heavy cost of cultivation the crop did well being helped on by the late rains. The main variety was "*rosea*" and the average outturn of the 14 acres grown on the farm was 443 lbs. per acre, the net profit being Rs. 28 per acre. Five varieties were tested on a fairly large scale and gave results as below.:—

Variety.	Outturn per acre.	Ginning percentage.	Remarks.
	lbs.		
Rosea	443	31½	Late.
Aligarh white flowered ...	509	34	
Saugor jari yellow flowered ...	461	30	Early.
Saugor jari white flowered ...	394	30	
Chhapara	361	25	

The ginning percentage of all cottons grown in Nimar and Hoshangabad seems to have been much lower than usual in the year under report.

Eight early varieties sent for trial by the Ecomomic Botanist were tested on areas too small to give reliable outturn figures.

No.	Ginning percentage.	Date of flowering.	Remarks.
1	2	3	4
1	26	11th September 1912.	
2	32	21st September 1912.	These varieties were all nearly three weeks later than the Saugor jari and Chhapara varieties.
3	36	26th September 1912.	
4	28	20th September 1912.	
5	35·5	22nd September 1912.	
6	21·25	21st September 1912.	
7	25·75	Do.	
8	27·75	20th September 1912.	

Samples were sent to the Imperial Cotton Specialist for valuation and were reported on by Messrs. Tata Sons & Co., Bombay (dated the 10th April 1913), as follows :—

No. 8 Saugor jari (white flowered)	...	It is softer in feel than Khandesh but inferior in staple value, Rs. 268. (Basis fine Khandesh Rs. 272.)
No. 9 Saugor jari (yellow flowered)	...	Better in staple than No. 8 and we value at the same as fine Khandesh, namely Rs. 272 per khandy.
No. 10 Chhapara	...	This sample may be classed between Nos. 8 and 9 value Rs. 270.
Nos. 1—8 Nagpur selections.	...	These 8 samples may be classed as Khandesh cotton. Nos. 1 and 2 are inferior in class, and we value them as Rs. 265; Nos. 3, 5, 7 and 8 are worth Rs. 270 per khandy, Nos. 4 and 6 show improvment in staple, and we value them as Rs. 275 per khandy. (Basis fine Khandesh Rs. 272.)

* * * * *

The Saugor jari yellow flowered variety seems to be a promising early kind suitable for the Northern Districts where the Berar varieties do not succeed owing to cold nights in November. The more promising of these will be grown again this year at Seoni-Chhapara and Jubbulpore.

The Aligarh cotton closely resembles *rosea* and seems to be slightly superior under local conditions and will be grown on a larger scale.

Tur (*Cajanus indicus*).—The trial of early varieties was continued and they were sown in lines with cotton.

Varieties.	Seed.	Pod.	Outturn per acre.
1	2	3	4
			lbs.
Boo5	White ...	Dark ...	1,456
Bo25	Do. ...	White ...	699
Bo16	Red ...	Dark ...	804
Bo21	Do. ...	do. ...	1,141
Unao	Do. ...	do. ...	337

The Unao Tur is extremely early, ripening in the first week of November, a month earlier than the earliest of the other varieties tried. Owing to its poor growth and the late sowing season, however, it gave a poor yield.

The two late Turs, Motia and Hoshangabad red, were sown mixed with rabi Til and gave an average outturn.

Tuar (*Andropogon sorghum*).—The Saoner variety was grown but was not suited by the season. The crop is not common in the neighbourhood and it is also later than the local varieties and consequently always suffers from the attack of wild pig and birds.

Ramkel, an earlier variety, was obtained from Akola Farm, but the seed failed to germinate. It will be tried again this year.

Green Urid and yellow Mung (*Phaseolus mungo*).—Were grown mixed with cotton and juar. Cloudy weather at flowering time resulted in a moderate yield.

Soybean (*Glycine Sojar*).—The small Nagpur fodder variety was again tried and gave a poor outturn for the above reason. The Dalney and Harbin varieties failed.

Ground-nut (*Arachishypoyana*).—The big Japanese variety was tried and gave an outturn of 1,018 lbs. per acre. The heavy black soils of this farm are not particularly suited to this crop.

Til (*Sesamum indicum*).—The Purvi variety of Maghai til which is sown in August and reaped in January was grown. This variety is a superior one, but the season was unfavourable, and poor yields were obtained all over the district. The outturn varied from 16½ lbs. per acre on good land to 126 lbs. on the inferior soils. Two varieties from the Soudan were tried as a "Maghai" crop. The white variety failed but the yellow seeded variety flowered after a month and although the yield was poor the quality was good and it may do better when acclimatized.

Paddy.—Raskadam, an early ripening variety of good quality, yielded at the rate of 870 lbs. per acre but was partly damaged by pig.

Chillies (*Capsicum*).—An early round variety was obtained from the Economic Botanist, Nagpur. It bore fruit in two months and yielded well. A medium and long variety also did well. The latter is very pungent.

Brinjal (*Solanum melonyena*).—A long rabi variety was obtained from Pachmarhi and did well.

Ambari (*Hibiscus cannabum*).—A Mexican variety was sent for trial by Mr. Murray of Rajabari (Harda). It possesses a deep purple flower of striking appearance. It appears to be short and branching in habit, however, and cannot compare with the local varieties for fibre.

A cucurbitous plant was tried, seed being obtained from the Soudan. The plants suffered from a leaf mildew and few fruits were obtained.

B.—Rabi crops.

Gram (*Cicer arietinum*).—A number of varieties of gram were tested in regular half-acre plots in field No. 1. The results are given below:—

Variety.	Yield per acre.	Size of gram.	Colour of gram.	Time of ripening.	Remarks.
1	2	3	4	5	6
	Lbs.				
Local ...	858	Medium. ...	Red and yellow.	Ordinary ...	Seed mixed red and yellow.
Nimari ...	724	Do. ...	Yellow ...	Very early.	The seed was a rough surface
Kabuli ...	565	Very large ...	White ...	A fortnight later than local.	Very fine quality.
Malida ...	846	Large ...	Do. ...	Do. ...	Do.
Pusa 5-A ...	795	Medium ...	Yellow ...	Do. ...	.....
„ 5-B ...	615	Do. ...	Do. ...	Do. ...	.....
„ 6-B ...	849	Do. ...	Dark ...	Do. ...	Inferior quality.
„ 2-A ...	165	Small ...	White ...	Very late ...	Seed similar to the local parbution variety.

The Pusa varieties have a more upright habit than the local grams and Nos. 5-A and 6-B are promising. Hot winds in March shrivelled 2-A before it reached maturity. The Malida gram did exceptionally well. It is a variety of high quality and should be in good demand for export.

Peas (*Pisum arerusE.*)

One garden and two field varieties of good quality were tried and did well.

Variety.	Yield per acre.	Remarks.
1	2	3
	Lbs.	
Khaperkheda	2,040	A garden variety irrigated.
Damoh	2,250	Unirrigated.
Acclimatized	1,253	Do.

The Damoh variety was discovered two years ago growing in a small patch in a garden near Damoh. It has a large round white seed with a peculiar black hilum which gives the variety a distinctive appearance.

Linseed (*Linsum usitatissimum*).—The yield of this crop was good. Six selected types, sent for trial by the Principal, Agricultural College, Nagpur, were tested on a level piece of maryar soil together with the farm main variety 1452-F-2 which is itself a selected type and had been chosen as the best yielder as the result of two years trials.

Variety.	Seed.	Yield per acre.
1	2	3
		Lbs.
55'000	Red ...	432
27'2000	„ ...	456
27'2000	„ ...	475
52'000	„ ...	500
17'3000	White ...	326
18'1000	„ ...	335
Farm	Red ...	558

The Farm variety gave the biggest outturn, while the white seeded types have yielded considerably less than the red varieties.

Wheat.—This crop did exceptionally well. The varieties sown are all selected and the demand for seed is far greater than the supply. The actual outturn of the five main varieties grown on the field scale on the non-experimental area is given below :—

Variety.	Area sown in acres.	Yield per acre.
1	2	3
		Lbs.
Sukerhai (pissi)	101'09	714
A-013 (pissi)	4'33	997
Hansi pissi	12'55	593
Bansi	17'29	978
Jalalia (A-007)	21'58	591

The Jalalia (A-007) was sown on maryar land and being late sown suffered from water-logging after the November rain. Hansi pissi is suited for light soils than are present on this Farm. A plot of 2½ acres of Bansi yielded at the rate of over 1,500 lbs. per acre.

Variety tests were carried out on a very level piece of land which had been turnwrested in the previous year. The plots were one acre in size.

Number.	Variety.	Outturn per acre.	Class of wheat.
1	2	3	4
		Lbs.	
1	Bansi	1,157	Durum.
2	Ordinary red headed (Jalaila) ...	916	do.
3	A-007 (Jalalia)	1,073	do.
4	Dahutia	1,022	do.
5	Sukerhai Pissi (selected) ...	1,177	Vulgare.
6	A-013 (Pissi)	1,080	do.
7	Pusa 4	993	do.
8	Hansi Pissi	920	do.
9	A-049	1,245	do.
10	A-050	1,090	do.
11	Malvi Pissi	747	do.

Dahutia, which was raised on the Farm, is a durum wheat of high quality, but is rather late. A-049 is a soft white wheat, a cross between Murya and Khapli. Pusa 4 changed greatly in grain character and had a very high percentage of mottled grains, detracting largely from the appearance of the grain in sample. For such an early wheat it is a good yielder.

A number of other crosses and selections were tested on a smaller scale, and the best will be tried on a field scale next year. The results are recorded below :—

Name.	Area of plot acre.	Outturn per acre.
1	2	3
	Acre.	Lbs.
Bansi Nasil	·0815	790
Sardar x Indian	·078	801
Sardar x Zuff	·063	857
A-100	·187	800
A-059	·160	813
A-098	·281	782
A-097	·077	812
A-096	·11	827
A-095	·115	791
A-094	·0665	826
A-093	·115	809
A-085	·158	854

Statement showing the details of cropping during the year 1912-13.

Crop.	Area.	Crop.	Area.
1	2	3	4
	Acres.	*Non-experimental Kharif.*	Acres.
Experimenal Kharif.		Rosea cotton, tur and ambari ...	6·95
Cotton ...	3·80	Catton and tur varieties ...	2·50
Cotton and tur ...	·60	Saoner juar and mung ...	3·25
Total ...	4·40	Total ...	12·78
Experimental Rabi.		*Non-experimental Rabi.*	
Pissi ...	6·70	Pusa gram varieties ...	1·33
Gram ...	1·70	Nimar gram ...	·67
Teora ...	·20	Kabuli gram ...	1·50
Masur ...	·20	Malida gram ...	6·00
Linseed ...	·20	Local gram ...	10·89
Birra ...	·40	Bansi wheat ...	17·29
Total of Experimental Plots ...	13·80	Sukerhai pissi ...	101·09
Garden Crop.		A-013 selected pissi ...	4·38
Brinjals ...	·08	A-007 Jalalia ...	21·58
Total ...	·08	Wheat varieties ...	7·00
Double Cropped Area.		B class wheat ...	1·65
Paddy and gram ...	·60	Hansi pissi ...	12·55
African til and gram ...	·20	Khaperkheda peas ...	·09
Groundnuts and sugarcane ...	·25	Damoh peas ...	·14
Chillies, coriander, cabbage and knol-khol.	·27	Acclimatized peas ...	·92
Urid and pissi ...	·18	Red linseed ...	1·48
Mung and oats ...	·12	Linseed varieties ...	6·00
Soy bean and oats ...	·10	Linseed and gram ...	5·95
Total ...	1.72	Parvi Maghi tilli and tur ...	20·10
		Rabi Urid ...	·88
		Total ...	221·49
		Total of Non-experimental Crops ...	234·27
		Total Cropped Area ...	249·87
		Roads and Wells, etc. ...	·87
		Total ...	250·74

Seed Depôt.—The demand for selected wheat seed from this Farm continues to be as keen as ever. The quantity actually shown in the accompanying statement is not so great as last year, but this is partly due to the fact that owing to the early commencement of the rains and the railway strike, a certain quantity of seed could not be sent out in time and will have to remain in store until October.

List of seed supplied from the Government Experimental Farm, Powarkhera, from 1st July 1912 to date.

Name of seed.	Quantity	Total
1	2	3
RABI.	Lbs.	Lbs.
Wheat—		
Sukerhai pissi	42,002	
Soharia	2,433	
Hansi	7,353	
Hansi pissi	1,428	
Wheat varieties	3,400	
Jalalia	1,060	
Dahutia	320	
Pusa 4	270	58,276
Linseed—		
White linseed	376	
Red linseed	166	542
Gram—		
Malida gram	1,953	
Kabuli gram	482	
Nimar gram	325	
Gram varieties	280	3,040
Peas—		
Acclimatized peas	238	
Khaperkhera peas	110	
Damoh peas	2	350
Oats—		
Oats	2	2
Til—		
Purvi Maghai til	464	
Brown Maghai til	2	466
KHARIF.		
Cotton seed—		
Rosea	2,951	
Aligarh	246	
Early cotton varieties	65	3,262

List of Seed supplied from the Experimental Farm, Powarkhera, from 1st July 1912 to 30th June 1913.—(Concld.)

Name of seed.	Quantity.	Total.
1	2	3
Juar—	Lbs.	Lbs.
Saoner	142	
Ramkel	95	237
Paddy—		
Raskadam	249	249
Tur—		
Early tur varieties	82	
Unao tur	40	
Hoshangabad	22	
B. O. 16 Tur	2	146
Sann—		
Sann	40	40
Groundnuts—		
Spanish peanuts	40	
Big Japan	2	42
Miscellaneous—		
Seeds	16	16
Grand Total ...	...	66,668

Crop Diseases and Pests.

Insect attacks.—The season was on the whole singularly free from insect pests.

The grain caterpillar (*chloridea obsoleta*, F.) did a certain amount of damage during cloudy weather in February.

The til beetle did a considerable amount of damage to Maghai til in its earliest stages of growth.

Termites did little damage to the wheat crop in the year under report.

Fungoid diseases.—Dr. Butler, Imperial Mycologist, visited the Farm in September and made a detailed enquiry into the cause of Wilt diseases on til (*Sesamum indicum*) which is prevalent in certain places in the Maghai varieties.

Root parasites.—Mr. Shaw, Assistant Mycologist of Pusa, visited the Farm to enquire into the damage caused by agia (*Soriga lutes*). This pest was found affecting juar and *kodo*.

(*Paspulum scrobiculatum*).—Mr. Shaw carried out spraying experiments at Powarkheda with a 10 per cent copper sulphate solution on "agia" attacking juar. The parasite was killed to the ground surface and the lower leaves of the

juar plants were also burnt where the spray had reached them. The "agri" sprang up again from the roots and a second spraying is evidently necessary. Mr. Shaw is continuing his researches on the pest and also at my request made an examination of another root parasite with a red flower known as "para" (*Scpubia delphinifolia*). This pest does a good deal of damage to the hay crop in the grass reserve on the Farm and in some years seriously lowers the outturn of hay. It was also found attacking the millet known as *sama* (Panecum pumenttacum) ; neither pest however seems to affect bagra (*Pennisetum typhoideum*).

V.—Implements and Machines, Trials of Machines.

Nerbudda reaper.—As mentioned in last year's report this machine had been specially designed to suit local conditions. Numbers of persons came to see this machine working at the time of divisional meeting, and over thirty orders were received. A consignment of twenty had been ordered and of these fifteen machines only arrived intact. These were immediately disposed of, but many persons were naturally disappointed at not being able to purchase a machine, it being impossible to get a new consignment out in time for the year's wheat harvest. Arrangements have been made with Messrs. John Wallace & Co. of Glasgow, the makers, to have these machines stocked by their agent (Messrs. Volkart Bros., Bombay), and a number of spares will be kept at the farms. It is hoped that the difficulty of supplying machines at the right time will thus be avoided.

This machine was thoroughly tested on a large scale on 160 acres of wheat on the Farm and without its assistance it would have been impossible to have finished the harvest in time.

A good pair of bullocks is required to work the machine, the average price of such a pair locally being Rs. 200, and bullocks of this class are usually in the possession of Malguzars in these parts.

This machine is sold at the Farm for Rs. 200. Two men are required on the machine and seven following and binding. Seven acres can be cut per diem, but the average on the Farm worked out at 6½ acres. The saving effected by using the machine as compared with labour paid in cash and kind, respectively, is given below, as it may prove of interest. It is taken in every case that 6½ acres per day or 195 acres per month are cut.

By machine—

		Rs.	a.	p.
9 men at 4 annas per day for 30 days ...	...	67	8	0
Depreciation on machine at 10 per cent ...	...	20	0	0
Oil, etc.	...	5	0	0
Bullocks at Re. 1 per day for 30 days ...	...	30	0	0
Total	...	122	8	0

Hand labour paid in cash—

Six coolies per day at Re. 0-4-0 cut one acre ; Rs. 1-8-0 per acre.

Cost of cutting 195 acres at Rs. 1-8-0 per acre ; Rs. 292-8-0.

(*N. B.*—In many cases the cost of labour is locally much higher than this at harvest time.)

Hand labour paid in kind by piece-work—

Three men cut one acre per day and get 45 lbs. grain at 25 lbs. per rupee; Rs. 1-12-9 per acre.

The cost of machine is therefore practically recovered in one season's working.

Special courses were organized on the Farm for training the servants of intending purchasers in the use of this machine and no one is advised to purchase one unless they have somebody who thoroughly understands its use.

Oil engine and pump.—A Gardner oil engine 7·7 B. H. P. and a centrifugal pump were put down on the big well. The plant was obtained from Messrs. Burn & Co., Howrah, who sent down one of their engineers to supervise the fitting up of the plant.

The lift is from 30 – 40 feet.

This plant delivered 15,000 gallons per hour at a head of 40 feet during an actual test in May. The engine is managed by the Farm blacksmith, and, as it is simple in construction, he has managed to master most of the essential details.

Ploughs.—The Monsoon plough made by Messrs. Ransome, Sims & Jeffries, as indicated by the preliminary trials mentioned in last year's report, gave good results and is now included as one of the regular implements on this Farm.

It is very useful for ploughing up stubbles and fallows after a shower of rain and was utilized to plough up a large field of juar stumps during the cold weather. The iron parts cost Rs. 12-8-0 and the complete plough with beam and handle, Rs. 15. It is worked by one pair of ordinary bullocks and turns a furrow 5—6 inches deep and 6 inches wide.

The turn-wrest plough made by Messrs. Burn & Co. was again successfully used on a land infested with the deep-rooted kans grass (*saccharum spyntaneum*).

An improved *box mote* made of galvanized iron sheeting with the sides and corners strengthend by angle iron was designed and is made by the Jubbulpore Reformatory School for Rs. 8-8-0.

Winnowers.—These machines were in great demand again this year and the Rasulia Friends Mission Works and Messrs. Sheo Dayal Mistry of Hoshangabad, who make these machines of galvanized iron sheeting, were unable to comply with all the demands received. All Rasulia winnowers are supposed to be tested and passed by the Farm staff before they are sold, but owing to certain frictions which have recently arisen, no such guarantee will be given by the Department for Rasulia machines in future.

The Mission also prepared a winnower of teak, which proved excellent in most respects, but they have not yet decided on the price.

The Cove's winnower has not yet passed the experimental stage.

A *seed drill* also designed by Mr. Cove, the Headmaster of the School of Handicrafts, Nagpur, is still under trial, and one or two defects have still to be remedied.

Messrs. Burn & Co. also sent the following machines and implements for trial and exhibition to the Divisional Agricultural Conference :—

A Norea pump worked by a 2·5 B. H. P. Gardener oil engine. A most effective exhibit.

A 14" Sirdar flour mill worked by a 5·9 B. H. P. Gardener engine wtih a capacity of $3\frac{1}{2}$ maunds of fine flour per hour. This also was a most striking exhibit.

Paddy husker, Rs. 80, not altogether a success.

Reflex chaff cutter Rs. 42 which was approved.

The Umfaan and Jackson flour mills Rs. 80, each worked by hand or bullock-power, which were promising.

Also a hay press, sugarcane mills, winnowers, hand hoes (planet junior type) and Meston ploughs.

The last two are specially suited for light soils and garden cultivation.

The total number of machines and implements sold through the Farm is 184 compared with 134 last year. As the Adhartal Farm has since been started and has supplied a large number of machines to the Jubbulpore Division, this indicates a large increase in the demand for improved machinery. The value of the implements sold was approximately Rs. 14,500, and the number of winnowers sold (95) shows a considerable increase over last year.

List of Machines and Implements sold through the Government Experimental Farm, Powarkhera, during the season 1912-13.

Name of machine.	No. sold.	Name of machine.	No. sold.
1	2	3	4
Imported Machines.		*Made by Messrs. Burn & Co., Howrah.*	
2 rollered sugarcane mills	2	Heavy turnwrest plough... ...	1
Cawnpur corn shellers	2	Pitcher spout pumps	1
American do.	3	Hand cultivators	2
Iron motes	6	Jackson grinder	1
Monsoon ploughs	37	A. A. Chaff cutters	2
Nerbudda reapers	15	D. A. Chaff cutters	2
Total ...	65	Meston plough	1
		Total ...	10
Made in the Farm Workshop.			
Daura and Dundia shares	2	*Made by the Friends' Mission Workshop, Rasulia.*	
Iron motes	2	Iron winnowers	70
Argara	1	Wooden do.	5
Dundia	2	Cove's do.	2
Daura	2	Motes	2
Country hand gins	2	Total ...	79
Sindh ploughs	1		
		Made by Messrs. Sheo Dayal, Hoshangabad.	
Total ...	12	Iron winnowers	18
		Total ...	18
		Grand total ...	184

VI.—Expenditure and Receipts.

The receipts really total to over Rs. 6,000. Owing to delay in arrival of a ginning machine, the cotton crop could not bes old before the 31st March 1913, as the seed is all required for seed farms. This together with groundnut and Purvi til seed which are also kept to supply the demands for seed this kharif season amount to Rs. 867 and would bring the actual value of the receipt up to Rs. 6,030. On the expenditure side, the head "Miscellaneous" includes the following items of extraordinary expenditure :—

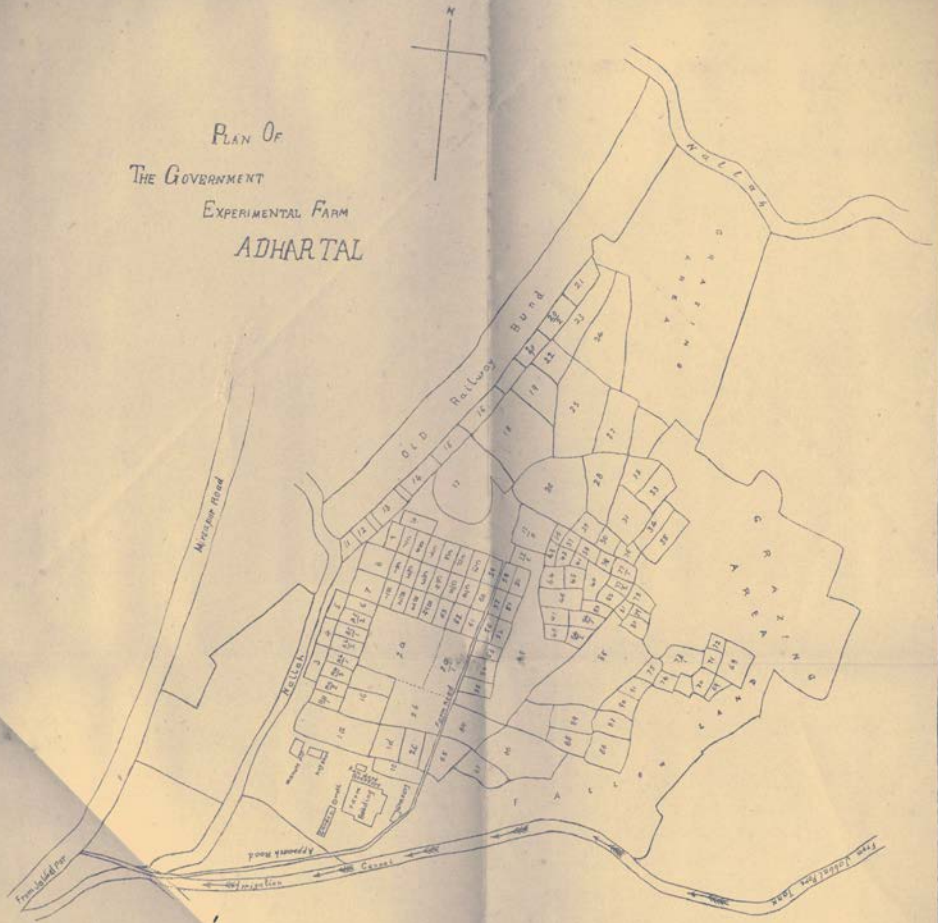
	Rs. a. p.
Balance due on account of oil engine	914 6 11
Railway freight on oil engine	79 13 0
Farm gun	53 3 0
Iron pipes, iron wheels, etc.	128 2 0
Cost of gunny bags for next year's seed distribution ...	154 0 0
Total ..	1,329 8 11

Many of the kamdars and servants paid from contingencies are largely employed throughout the year for demonstration work and are absent from the Farm for considerable periods, so the item Rs. 2,531-11-8 under the head is also abnormally large.

Statement showing the Receipts and Expenditure of Powarkhera Experimental Farm for the Financial year 1912-13.

Heads.	Amount.	Total.
1	2	3
RECEIPTS.	Rs. a. p.	Rs. a. p.
Commercial sale of produce	2,132 3 5	
Distribution of seed	2,731 8 5	
Plants and implements	64 4 0	
Miscellaneous	234 12 9	5,162 12 7
EXPENDITURE.		
Contingencies.		
Charges for seed grain	153 7 9	
Farm buildings	719 1 5	
Construction and repairs of roads and irrigation ...	488 12 0	
Purchase of cattle and implements	712 3 1	
Feed and care of cattle	754 1 9	
Servants paid from contingencies	2,531 11 8	
Purchase of books and periodicals	102 14 4	
Manure	99 2 0	
Wire fencing	242 4 0	
Service postage and telegram charges	100 6 0	
Stationery purchased locally	1 0 0	
Miscellaneous	1,604 6 6	
ESTABLISHMENT.		7,509 6 6
Pay of Agricultural Assistants and Clerk	2,583 13 3	
Pay of servants (Jamadar and Peon)	168 5 1	
Travelling allowance	124 10 0	
		2,876 12 4

Plan Of
The Government
Experimental Farm
ADHARTAL



Annual Report on the Government Agricultural Station, Adhartal (Jubbulpore), for the year 1912-13.

I.—History.

The Jubbulpore Division has up to the present been without an Experimental Farm, but the claims of this tract and the repeated demands of local agriculturists had rendered it evident for some time past that a farm would have to be opened as soon as the necessary staff was available.

Accordingly instructions were received last year to choose a suitable site, and 115 acres of land in the village of Adhartal were finally selected. The Farm is situated close to the Mirzapur road on the outskirts of the city and about three miles from Jubbulpore Railway Station

The area is commanded by the Jubbulpore Irrigation tank, as the original intention was to confine the work on the Farm very largely to matters concerning the economical use of water and the methods of cultivation best suited to areas commanded by the many small Irrigation schemes which have recently been opened in this Division.

It was soon evident, however, that the Farm would have far wider functions than this and it is rapidly developing into the head-quarters of all improvements in Agriculture, both from the research and educational point of views, for the whole Division.

The land consists of Sihar and Domatta soils of inferior quality which is, however, typical of much of the land in the Division.

Occupation of the land was not taken until April 1912 and, as the whole area was fallow, much hard work was necessary to get even a portion of the land ready for the following, kharif and rabi crops.

The area actually cropped last year was as follows:—

Details of area.	Acreage.	Total.	Grand total.
1	2	3	4
Experimental	4·60	...	
Rabi crops	25·03	...	
Kharif crops	14·19	...	
Groundnut and garden crops	8·79	52·61	
Roads and buildings	2·00	2·00	
Fallow area	11·00	11·00	
Grazing area	49·39	49·39	
			115·00

A further area (25 acres) of Domatta soil was acquired in 1913 and will be brought under cultivation next year.

It is also proposed to lease or acquire about 20 acres of black wheat soil, typical of the embanked Jubbulpore "Haveli," in order to carry out cultivation and drainage experiments.

Climate.—Jubbulpore is situated at the head of the fertile Nerbudda valley, and owing to the proximity of forest and its comparatively high situation (1,300 feet) it enjoys an equable climate. Frost occasionally occurs, and the cold weather is more marked than in the rest of the Central Provinces, while the hot weather is rarely of long duration.

The rainfall for the year under report, as measured at Jubbulpore, was 48·38 inches, being 6½ inches below the average rainfall of the last forty-five years. A raingauge has now been established at the Farm itself.

Season.—The season in 1912-13 was on the whole decidedly unfavourable. The monsoon arrived very late and heavy rain did not occur until the second week of July. Afterwards a long break in September caused anxiety and hindered the growth of the rice which was in a backward condition owing to late sowing. Showers in the early part of October, however, did much good in bringing the rice crop to maturity and securing sufficient moisture for rabi sowings, while heavy rain in the third week of November greatly assisted the early sown rabi crops. Cloudy weather with heavy rain in February together with some hail damaged the wheat crop on the Farm and induced a severe attack of rust.

In spite of the fact that the land was newly broken and much levelling had to be done, the rice crop was a fair one, as Irrigation water was utilized during the long break. For the reason noted above and also because the land is inferior and sufficient time had not been obtained to put it into a proper state of tilth, the rabi crop was a poor one.

Owing to the uneven state of the ground it is impossible to draw accurate conclusions from the results of the various experiments and they will not therefore be published in this report in detail.

Buildings and Roads.—Owing to the non-arrival of material from England the Farm area could not be fenced, and a certain amount of damage was done to crops by stray cattle and antelope.

Six students' quarters for the accommodation of cultivators attending the short courses of instruction have been completed by the Public Works Department, and the earth work of an approach road is also finished, and metalling will take place after the rains are over.

A seed store and Dutch barn were put up departmentally in addition to a sweeper's hut.

Staff.—The Farm was in charge of Mr. Ganpati Narayan from the beginning, and it is largely due to his zeal and energy and also to Mr. Lakshminarayan, the First Overseer, that so much has been done in such a short time.

General.—The Farm was visited twice by the Hon'ble the Chief Commissioner, Central Provinces (Sir Benjamin Robertson), and also by the Hon'ble Mr. E. S. Montague, the Financial Commissioner, the Commissioner, Jubbulpore Division, the Deputy Commissioner, Jubbulpore, and many other officials.

The Agricultural Show held on the Farm on the 14th February 1913 was well attended in spite of the inclement weather, and, apart from this, 583 persons visited the Farm during the year under report, a day rarely passing without the advent of one or more visitors. The interest taken by the public in the progress of the Farm was, in fact, most marked.

II.—Experimental Series.

SERIES A.—Trials of various methods of rice cultivation.

Area of plot—·20 acre. *Soil.—Sahara.*

Plot No.	Class of rice sown.	Method of sowing.
1	2	3
A a-1	Early rice (Basmatia)	Broadcasted.
A a-2	Do. do.	Machowa.
A a-3	Do. do.	Transplanted. *
A b-1	Medium rice (Haradgundi)	Machowa.
A b-2	Do. do.	Transplanted. *
A c-1	Late rice (Gurmatia)	Machowa.
A c-2	Do. do.	Transplanted. *

* *N. B.*—Transplantation in this, as in all the experimental series, was done with single seedlings.

Owing to the uneven nature of the plots the results obtained are not reliable. "Machowa" is a local system in which the land is made into a puddle in the same way as for transplantation and germinated seed is then broadcasted. For early rices there is probably little difference in profit between transplantation and the "Machowa" method, but in transplantation, owing to the longer growing period, transplantation has the pull. The price of labour close to a big city like Jubbulpore renders transplantation a somewhat costly method. The series will be continued next year.

SERIES B.—To test the value of green manuring (with sann hemp) for transplanted rice.

Area of plot—·20 acre.—Gurmatia, a late rice, was the variety utilized.

Plot No. I.—Transplanted only.
" II.—Green soiled before transplantation.
" III.—Same as No. 1.
" IV.—Same as No. 2.

The plots were too uneven to give reliable results, but there appeared to be only a slight increase in favour of green manuring. This was probably due to the fact that the soil was Sahra, a very light sandy loam which is not suited for a late variety of rice.

The experiment will be repeated on "Domatta," which is a mixed black and sandy soil.

SERIES C.—Manurial series on rice.

Plots—·20 acre each.—Variety, Dilbaksha.

Plot No. I.—No manure.
" II.—Poudrette, 20 lbs. Nitrogen per acre.
" III.—Farm yard manure do.
" IV.—Horse manure do.
" V.—Night soil (Meagher system), 20 lbs. Nitrogen per acre.
" VI.—Bone dust do.
" VII.—Sulphate of Ammonia do.
" VIII.—{ do. } 10 lbs. Nitrogen per acre.
{ Bone dust } do.
" IX.—Calcium Cyanamide, 20 lbs. Nitrogen per acre.
" X.—Mahua refuse do.
" XI.—No manure.
" XII.— do.

The plots were too uneven to give reliable results. Mahua refuse, which is the sediment left after the distillation of country liquor from the flowers of the Mahua tree (*Bassia latifolia*), gave satisfactory results. It is obtained in a dried form, somewhat resembling peat moss litter, from the distillery at Katni. This manure was analysed by the Agricultural Chemist and gave a nitrogen percentage of 2·19.

SERIES D.—Groundnut variety and manurial experiments. *Soil.—Sahra.*

Plot No.	Variety.	Manurial treatment.	Outturn per acre.	Value of produce.	Cost of cultivation.	Profit per acre.
1	2	3	4	5	6	7
			Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Baipur ...	No manure ...	1,677	139 12 0	55 4 6	84 7 6
2	Do. ...	Ashes ...	3,362	280 2 8	60 4 6	219 14 2
3	Big Japan ...	No manure ...	1,394	116 8 0	55 4 6	61 3 6
4	Do. ...	Ashes ...	3,591	294 4 0	60 4 6	238 15 6
5	Small Japan ...	No manure ...	865	72 1 4	37 12 0	34 5 4

Incinerator ashes were obtained from the Jubbulpore Municipality free of cost and were applied at the rate of 60 maunds per acre. This manure was analysed by the Agricultural Chemist, Nagpur, and the analysis is given below:—

Constituents.	Percentage.
Coarse stones, etc. ...	32·6
Nitrogen ...	·198
Phosphoric acid ...	3·41
Potash ...	1·54

III.—Varieties of Crops.

Wheat.—A number of different varieties were tested consisting mainly of selections and hybrids. It was impossible to obtain any reliable figures indicating the relative outturns of the different kinds. There is no first class wheat land on the Farm at present, and, as the land had to be broken up at short notice from fallow, it could not be properly prepared for wheat. As in addition the crop was damaged by hail and rust, the outturn was a poor one and averaged less than 500 lbs. per acre. The area under wheat was 17·54 acres.

An account of the rust attack is given under the head "Diseases and Pests."

Rice.—Twenty varieties were under trial, thirteen of these being selections sent by the Economic Botanist, Central Provinces. The total area under this crop was 0·32 acres and the average outturn per acre was more than 1,400 lbs. The crop was mainly transplanted or else sown by the local "Machowa" method. The outturn, seeing that this is the first year and that much of the land had only been partly levelled, is satisfactory and may be partly accounted for by the use of canal water, at the right time, during the long break in the rains.

Of the main varieties Kadamphool, Nasik early and Dilpasand are all very early and of good quality. Kadamphool is a good yielder but liable to damage by pigs This is also the case with Dilpasand and it also easily sheds its grain in harvesting. It is, however, a very fine quality rice and a good yielder and is in great demand. Nasik early is awned and not damaged by pigs. Dilbaksha

is a late variety yielding well and of good quality and is much liked locally. Gurmatia is coarse and very late but a very big yielder.

Of the new varieties tried, the best seems to be Eklombi, which is medium early, of medium quality and a heavy yielder.

Linseed (Linum usitatissimum).—Seven selected types sent by the Principal, Agricultural College, Nagpur, were tried. The season being unsatisfactory, the crop partially failed and no reliable results were therefore obtained.

Gram (Cicer arietinum).—Seven varieties were under trial, *i. e.*—

1. Local.	4. Pusa 2 (*a*).
2. Malida.	5. „ 5 (*a*).
3. Khandwa.	6. „ 5 (*b*).

7. Pusa 6 (*b*).

Malida gram is a large white seeded variety of high quality and gave a much better yield than the local variety on Domatta soil. In the district, however, where it was tried on a large scale, it suffered severely from "wilt" on Kabar; but did excellently on Mund, a lighter soil. In this way it behaves exactly contrary to local gram, which prefers the heavy Kabar land.

Khandwa gram has a yellow seed with a rough skin and is very early ripening.

Of the Pusa varieties, 2(*a*) has a small white grain resembling the local Parbatia, but it is much too late for these parts. 5(*a*) is the best on the whole, as 6(*b*), although a good yielder, has a dark unattractive looking seed. These Pusa grams have a much more upright habit than the local varieties.

Til (Sesamum indicum).—Two varieties of Sim Sim from Soudan and a selected type of local white til were tried, but owing to the unsatisfactory nature of the early part of the monsoon gave a poor yield. The Sim Sim, red variety, is very early.

Groundnuts (Arachis hypogaea).—Four varieties were tried, *i.e.*—

Local	...	... Late.
Big Japanese		
Raipur		
Small Japanese ...	...	... Early.

The local Sihar soil, although assessed at a very low rate, appears to be very suited for this crop and the late varieties with two irrigations at the end of the rains and manured with ashes gave crops of the value of nearly Rs. 300 per acre. The small Japanese variety, although giving a smaller yield, is very much easier to harvest as the nuts are not deeply buried and are all collected in a bunch round the main tap root. It is also a month earlier and does not require irrigation in an ordinary year.

Leguminous Crops.—These seem to do particularly well on the light soils of this Farm.

Mung (Phaseolus mungo).—A good quality variety, with a yellow seed, gave an outturn of 1,100 lbs. per acre.

Urid (Phaseolus mungo).—A superior variety, with a green seed, yielded at the rate of 840 lbs. per acre.

Soy bean (Glycine soja).—The small seeded Nagpur variety was grown as a fodder crop. It grew luxuriantly but it matured too late and consequently failed to ripen all its pods on the light soil on which it was tried and gave a poor yield of 210 lbs. per acre only. Other varieties will be tried on mixed black soil next year.

Sann (Crotalaria juncfa).—The soil appears to be suitable but the crop, owing to the late monsoon, partly failed, as it did elsewhere in the neighbourhood. Very few pods were formed and as a consequence sann seed is selling, this year, for as much as six seers per rupee. Several types were under trial.

Oats yielded about the same outturn as wheat and gave promise of being a useful local crop as there is a good demand owing to the proximity of Cantonments.

Peas.—Acclimatized and Damoh, both superior field varieties, grew luxuriantly but were partly destroyed by heavy rains.

Fodder Crops.

(Lathyrus sativus) was tried as a second crop after dhan but was late. It gave an outturn of 1,250 lbs. green fodder per acre.

(Andropogon sorghum) was sown on light soil which, although fertile, could not be thoroughly prepared. Without manure it did gave an outturn of 2,650 lbs. of green fodder per acre only.

Berseem (Trifolium alexandrinum) was grown as a second crop after paddy but owing to lack of experience with this crop under local conditions it was probably sown a month later than it should have been. It gave four cuttings of excellent fodder and was irrigated after each cutting. The yield of green fodder was 6,000 lbs. per acre.

Lucerne (Medicago sativa).—Four varieties were tried and four cuttings were taken from each. The results are given below :—

Name of variety.	Outturn of green fodder per acre in lbs.	Remarks.
1	2	3
Poona	5,133	
Sand	6,777	
Turkistan	2,910	
Arabian	...	Failed to germinate.

The sand variety did best and gave heavy 3rd and 4th cuttings. It is more bushy than Poona which has an erect habit. The Turkistan has a dwarf spreading habit resembling that of Dutch clover and is probably more suited for pasture.

(Senji Melilotus alba) gave only one cutting and a poor yield.

Garden Crops.—The neighbourhood of the Farm is admirably suited to the production of garden crops. The soil is light and free working manure is obtainable in quantity from the city which also affords an excellent market for the produce and in addition water is available in the areas commanded by the Jubbulpur tank. Experiments in various garden crops were consequently started.

Sugarcane.—About five acres of land was put under cane in February. Experiments are being made as follows:—

1. Cultivation experiments.
2. Variety tests.
3. Manurial tests.

Chillies (*Capsicum*).—Two varieties sent by the Economic Botanist were under trial. One is a round variety of pleasing appearance and is very early, requiring little irrigation in an ordinary year. The other is later and is a long red variety which is very pungent.

Mahua refuse appears to be a suitable manure for this crop. A satisfactory yield was obtained.

Turmeric (*Curcuma longa*) was grown with a light dressing of manure on light soil and gave promising results under the conditions in which it was grown, yielding 5,250 lbs. per acre.

Sweet Potatoes (*Ipomae batatas*)whis crop was grown as a second crop after groundnuts and a fair crop was obtained. The expense of digging is very great, however, and as the crop was rather late, prices are correspondingly low, so that little profit was made on this crop, which is common in gardens in the neighbourhood

Suckers were obtained from Jubbulpore, Narsinghpur and Mandla Districts where different varieties were said to occur. Each variety consisted of a mixture, but the special features of the different types found were noted and are given below :—

Type No.	Leaves.	Colour of runners.	Tubers.	Depth of tubers.	Locality.
1	2	3	4	5	6
1	Broad lobes ...	Red ...	Long, white and sweet but fibrous.	Deep ...	Narsinghpur and Jubbulpore.
2	Do. ...	Green ...	Long, red, sweet and no fibres.	Moderate depth ...	Narsinghpur.
3	Do. ...	do. ...	Round, white and hard ...	Fairly shallow ...	Mandla.
4	Narrow lobes ...	Red ...	Oval, white, fairly sweet...	Fairly shallow and in bunches.	Narsinghpur and Jubbulpore.
5	Do. ...	Green ...	Long, red, very soft and brittle.	Very deep. ...	Jubbulpore.
6	Do. ...	do. ...	Long, white ...	Moderate depth ...	Mandla.

Other crops, which were tried on the Farm on a small scale, were onions, garlic, potatoes, ginger and maize. With sufficient manure these crops are all likely to do well on the lighter soils of this Farm.

IV.—Diseases and Pests.

Rust (*Puccinia*).—On wheat.

Forty-one varieties of wheat were under trial during the year. Most of these were single line selections or hybrids and they were tested for rust resistance. Heavy rain in February brought on a severe attack of rust. All three of the rusts, common on wheat in India, were present, but *P. Glumarum* was the most prevalent, whereas last year *P. Triticina* was the most abundant.

Mr. Graham, the Economic Botanist to the Central Provinces, Agricultural Department, and Mr. Shaw, the Assistant Mycologist at Pusa, both visited the plots and went through the different varieties in detail with me. The degree of attacks of the several rusts on each of the varieties is tabulated below and is the result of our joint observations :—

Name of variety.	Degree of attack.			Remarks.
	P. Graminis.	P. Glumarum.	P. Triticina.	
1	2	3	4	5
Bansi	...	II	I	Grain not affected A very early variety
P 4 (Pusa)	Trace.	...	Trace.	
Firbank Australian ...	...	II	Do.	
Bunjip do. ...	...	III	II	
Chul do. ...	...	...	II	
Ceder do. ...	...	Very slight	..	
Warren do. ...	...	I	...	
Comeback do. ...	...	II	...	
A-080 do. ...	...	II	...	
A-107 do. ...	...	II	...	
A-108 do. ...	...	II	...	
A-109 do. ...	...	II	...	
A-111 do. ...	...	II	...	
Sardar × Indian ...	...	III	II	
Sardar × Zuff ...	...	...	Trace.	
Lal Kusrawala ...	...	...	...	
Hansi Pissi ...	...	II	...	
Murya ...	...	I	I	
A-089 (selected from Murya) ...	...	...	...	
A-088 do. ...	...	...	...	
A-086 do. ...	...	IV	...	
A-050 do. ...	...	IV	...	
A-049 do. ...	...	IV	...	
A-003 do. ...	III	II	...	The attack developed late.
A-068 do. ...	...	...	...	
A-012 do. ...	...	IV	..	
A-112 do. ...	...	...	Trace.	
A-113 do. ...	A few spots ...	...	Do.	
A-114 do. ...	...	...	Do.	
A-115 do. ...	...	...	Do.	
116 ...				
117 ...				
118 ...				
119 ...	...	IV	...	Very bad leaves and ears attacked.
120 ...				
121 ...				
104 ...				
105 ...	II	II	II	
106 ...				

Selections for rust resistance were also made in a cross between Warren and Sukerhai Pissi which was in the second generation, and promising results were anticipated.

The results of these tests show that seven or eight of the varieties tried give promise of being resistant to rust and as most of these are of commercial value, they will be propagated on as large a scale as possible, so that seed may become available for distribution.

Loose smut of wheat (Ustilago triticini) was more abundant than usual and appears to be spreading, as many fields in the district were seen which had as much as 5 per cent or more of attacked ears. Grain from an affected crop should not be used for seed.

The leaf spot disease (Pseudopeziza trifolii Fekl) was prevalent on some of the lucernes, while other varieties were free as shown in the statement below :—

Variety of Lucerne.	Degree of attack.
Poona ...	Badly attacked, leaves and stems being covered with spots after the heavy rain in February, and the last two cuttings consequently gave small yields.
Turkistan ...	Moderate attack only.
Sand ...	No disease.

Wilt disease was not common, but a few cases occurred on soy beans and on the large white variety of gram known as Malida. The latter, however, was badly attacked in Sehora Tahsil where it is being grown on an extended scale. On heavy clay land ("Kabar") as much as 30 per cent of damage, in some cases, occurred ; but where grown on the lighter Mund soil, little damage was noticed.

Insect pests.—The crops were on the whole very free from insects.

The gram caterpillar (Chloridea obsoleta) appeared in small quantities but was checked by the heavy rain in February.

A few cases of stem-borer occurred in the rice crop, more particularly in lowlying parts of the fields, where, owing to unevenness of the land, deep water stagnated.

Dodder (Cuscuta) was prevalent on berseem, the seed being apparently imported with the berseem seed from Egypt along with chichory and one or two other interesting weeds. This parasite was not noticed on any other crops on the Farm.

V.—Machines and Implements.

Ploughs.—The Meston plough (Messrs. Burn & Co., price Rs. 4) is admirably suited for rice cultivation on the lighter soils. For preparing the land for "Machowa" sowing or transplantation it is far more effcient and rapid than the country plough as all weeds are turned under the soil and subsequent weedings are not so frequently required.

Monsoon plough.—The Monsoon plough, which is a new design by Messrs. Ransome, Sims & Jefferies, has been found most useful for breaking up new land and for cold weather ploughings. It has the advantage of being easily worked by an ordinary pair of bullocks and its price, Rs. 14, is very reasonable.

The two ploughs are in constant use on the Farm and are already in great demand in this district, although this is the first year in which they have been demonstrated.

The Planet Junior cultivator (Messrs. Burn & Co., price Rs. 13-8-0) has proved most useful for inter-cultivation of garden crops and gives much hand weeding. The *Nerbudda reaper* (Messrs John Wallace, & Co., Glasgow, Rs. 200), which has been specially designed for Central Provinces conditions, was successfully worked on wheat. In this district, however, its use will at present be restricted, as the local custom is to sow a mixture of wheat and gram.

Iron dredgers made by the Jubbulpore Reformatory School and costing Rs. 12 are useful implements for levelling fields.

The Bon Accord winnower was given a trial with most satisfactory results. This machine can be adjusted to separate wheat from gram and hence will be most useful for the mixture of these two crops, which is usually sown in the neighbouring districts.

The following statement shows the numbers of machines and implements sold by the Farm during the year under report :—

Serial No.	Name of machine or implement.		No. sold.	Total.
1	2		3	4
1	Ploughs ... Meston plough		61	...
	Monsoon plough		15	...
	Turnwrest plough		4	...
	Other ploughs		3	83
2	Plough Shears		2	2
3	Winnowers ... Rasulia winnowers		2	...
	Cove's winnowers		1	3
4	Sugarcane		...	...
	Mills ... Burn's sugarcane mills		2	...
	Nahan Do		26	28
5	Hand cultivators		12	12
6	Nerbudda reapers		2	2
7	Fodder cutters		2	2
8	Pitcher spout pumps		4	4
9	Dredgers		5	5
10	Iron moles		10	10
11	Bullock hoes		4	4
		Total ...	...	155

VI.—Seed Depôt.

Owing to the large number of visitors and the interest taken in the Farm, there was a strong demand for seed, and as the area under cultivation, this year, was small, this demand could not nearly be complied with although the seed was sold at enhanced rates. At the sowing season, many cultivators came in every day, often from a long distance, and applied for seed. The seed, this year, was only sold to persons who are well known to the Department and who promise to propagate the seed they buy on a large scale.

The statmeent below shows the actual amount of seed disposed of, with the exception of some rabi seeds which will not be sent out until October:—

Variety.		Quantity in lbs.	Total.
1		2	3
Rice ...	Kadamphool	1,973	
	Basmatia	422	
	Nasik early	1,658	
	Dilbaksha	1,040	
	Eklombi	355	
	Others	378	5,826
Wheat ...	Bansi	1,820	
	Mundi early	214	
	Others	100	2,134
Groundnuts ...	Small Japanese	660	
	Big Japanese	524	
	Raipur	170	1,354
Other crops ...	Sundia Juar	1,040	
	Maize, chillies, &c., &c., ...	205	1,245
	GRAND TOTAL ...		10,559

VII.—RECEIPTS AND EXPENDITURE.

As only a small area (48 acres) was under cultivation in the year under report, the actual receipts are not large, but the value of the produce per acre averages over Rs. 33, which is mainly due to the large profits obtained from groundnut cultivation and the comparatively good yield of the rice crop.

Expenditure was necessarily heavy during the first year as much capital had to be sunk in cattle, implements, seeds and casual labour employed in breaking up fallow land. The capital sunk in the cane crop now growing also comes into this year's budget of expenditure.

Statement of Receipts.

	Rs.	a.	p.
Value of grain and other produce actually received	223	4	2
Value of grain and other produce (excluding fodder) actually in stock or recently sent out but of which cost has not yet been recovered.	1,371	5	3
Total ...	1,594	9	5

Statement showing the Expenditure of the Experimental Farm, Adhartal, for the Financial year 1912-13.

Heads.	Amount.	Total.
1	2	3
	Rs. a. p.	
Supplies and Services.		
Charges for seed and grain	649 7 11	
Farm buildings	1,993 1 0	
Purchase of cattle and implements	1,993 11 0	
Feed and care of cattle	1,006 2 3	

Statement showing the Expenditure of the Experimental Farm, Adhartal, for the Financial year 1912-13.—(Concld.)

Heads.	Amount.	Total.
1	2	3
	Rs. a. p.	Rs. a. p.
Variable labour and servants paid from contingencies ...	2,265 7 0	
Manure	200 0 0	
Roads and Irrigation	200 0 0	
Miscellaneous	590 1 0	
Purchase of books and periodicals	149 2 2	9,047 0 4
Contingencies.		
Postage charges	60 0 0	
Stationery purchased locally	0 14 6	
Conveyance of forms	1 6 0	62 4 10
GRAND TOTAL ...		9,109 4 10

G. EVANS,
Deputy Director of Agriculture,
Northern Circle,
Central Provinces.

VII.—APPENDIX.

Short courses of training in practical agriculture.—Owing to difficulties regarding accommodation, only a limited number of students could be taken on this Farm during the year under report. The actual number of students attending the classes is given below :—

Class of student.	Number.	Remarks.
1	2	3
Government Kamdars	6	One has since been dismissed.
Hawaldars sent by Malguzars ...	4	
Total ...	10	

These students were treated as one class and stayed on the Farm for nine months receiving practical instructions in improved methods of kharif cultivation.

Accommodation for five more students has since been constructed and a further series of quarters will be built after the rains are over.

G. EVANS,
Deputy Director of Agriculture,
Northern Circle,
Central Provinces.

Report on the Cattle Breeding Farm, Powarkheda, for 1912-13.

The farm adjoins the experimental farm proper and is under the management of the same Superintendent. The area is 264 acres of which 55 acres are reserved for hay and the remainder is left for grazing. The herd consists of pure Malwi cattle, and bulls are bred for stud purposes.

The old stud bull was sold as he was getting old and a younger bull bred on the farm has taken his place.

Five young bulls were sold during the year at Rs. 100 each and the demand for stud bulls from this herd is now very much greater than the supply.

Health of the herd.—As a safeguard all the cattle were vaccinated for Hæmorraghic septicemia in the middle of August. Rinderpest was very prevalent in the neighbouring villages at the beginning of the cold weather, and as a precautionary measure it was decided on the advice of the Superintendent, Civil Veterinary Department, to inoculate in the first week of November and again a fortnight afterwards. As a result of the above measures there were no casualties from either of the above mentioned diseases. Foot and mouth disease broke out in February. It was very common in surrounding villages and although every precaution was taken, infection occurred, being probably carried by the water of the farm nullah which flows down from Byaora, a neighbouring village which was badly attacked. No death occurred and, although many of the animals lost condition, the disease had disappeared by the middle of March.

Casualties.

One heifer was lost on account of the death of her fœtus. One small bull calf died of liver complaint and another bull accidentally fell into the nullah and broke his back.

Fodder, etc.

The hay crop was a poor one but proved sufficient with the reserves in hand. Thirty acres of grass was cut green by the Nerbudda reaper and collected by the horse-rake worked by a pair of bullocks.

Some 290 maunds of the coarse grasses (guner and baroo) were cut green and made into silage with satisfactory results; being given to the cattle during the two hot weather months.

STATEMENT I.—Showing the receipts and expenditure of the Cattle Breeding Farm, Powarkheda, for the financial year 1912-13.

Heads.	Amount.	Total.
1	2	3
	Rs. a. p.	
Receipts.		
Sale of animals	1,080 0 0	
Sale of produce	143 9 1	1,223 9 1
Expenditure.		
Feed and care of cattle	904 15 4	
Buildings and wire fencings for the newly acquired area	1,505 7 11	
Purchase of stock	...	
Servants paid from contingencies	271 2 9	
Miscellaneous	182 13 4	2,864 7 4

STATEMENT II.,—Showing casualties on the Cattle Breeding Farm, Powarkheda, from 1st July 1912 to 4th May 1913.

Description.	Balance on 1st July 1912.	Recipts		Total.	Issues.			Total	Balance on 14th May 1913.	Remarks
		Birth	By transfer		Death.	Sale	Transfer to other heads.			
1	2	3	4	5	6	7	8	9	10	11
Cows ...	24	...	7	31	..	8	...	8	23	
Cow calves at foot.	8	2	...	10	...	4	4	8	2	
Bull calves at foot.	5	13	...	18	...	2	5	7	11	
Heifers ...	19	...	4	23	1	3	7	11	12	
Bulls ...	21	..	5	26	3	6	..	9	17	
Total ...	77	15	16	108	4	23	16	43	65	

Eight cows with six calves at foot and three heifers were sold.

The cows were mostly disposed of on account of age and the remainder because they were not true to type

Report on the short courses of instruction in practical Agriculture on the Powarkheda Farm, 1912-1913.

These courses are three in number—

(1) In July and August, when improved kharif (cotton and juar) cultivation is taught.

(2) In October and November, when the sowing of rabi and harvesting of kharif is demonstrated.

(3) In March and April to teach better methods of harvesting rabi crops, etc.

The course is entirely practical and lasts for six or seven weeks. A short lecture is given in the field and the lesson taught in the lecture is then learnt practically in the field. As the different districts served by this farm are so varied in their agricultural possibilities, it is now being found most convenient to arrange for students from a particular district to attend a single course. A skeleton list of subjects to be taught is drawn up and this added to or reduced to suit the particular class attending the course.

Thus in the first course most of the students came from the Narsinghpr district and Jubbulpore supplied the three men in the second course; which is always poorly attended as it is one of the busiest times of the agricultural year. The third course was attended by five Malguzars from the Betul district and a number of Hawaldars in their private service or of that of the Court of Wards and in addition several men came from the Bhopal State.

Four men were under training throughout the year for the post of Government Kamdars and one man was sent for the same course of training by the Betul Agricultural Union.

Statement showing the number of students attending short courses.

District from which students came.	1st Course, Kharif.	2nd Course Rabi.	3rd Course, Rabi.	Total.
Narsinghpur	*5	...	...	
Saugor	1	...	...	
Jubbulpore	1	3	...	
Betul	...	...	14	
Bhopal	...	...	†3	
Total ...	7	3	17	27

*Sent by the Narsinghpur District Council who paid their expenses.

†Sent by Bhopal State.

G. EVANS,

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Central Provinces.

Report on Agricultural Demonstrations in the Nerbudda Division for 1912-13.

I.—Introductory.

This report gives a brief account of the operations of the Agricultural Department in the five districts of the Nerbudda Division apart from the working of the Experimental Farm, Powarkheda, which is published as a separate report.

II.—Demonstration Farms.

Khandwa.—This farm was originally intended to test certain varieties of cotton, juar and bajra. Four varieties of cotton and two of bajra were under trial but Ramkel juar failed as the seed did not germinate.

The season was so unfavourable that no definite results could be obtained. Sowings, owing to the late arrival of the monsoon, did not take place until July 18th and the rainfall was altogether abnormal, only some 12" being received during the monsoon months.

Variety.	Area grown.	Outturn per acre lbs.	Time of flowering.
	Acre.		
Saugor jadi	1	210	1st week of October.
Malvensis	½	172	3rd week of October.
Rosea	½	180	1st week of November.
Buri	½	27	Do.

Buri made good growth at the start but the hot weather in October caused the leaves and flowers to dry up. Malvensis suffered slightly from wilt disease. In a dry season like last year, the early ripening Saugor jadi did best. The ginning percentage of all these varieties was abnormally low, rosea for instance only yielding a percentage of under 32.

Both bajra varieties grew well, but, owing to the early cessation of the rains, the flowers did not fertilize properly and consequently many heads were barren of grain, although they were large in size. Both will receive a further trial this year. The monsoon plough and chaff cutter were demonstrated with success.

Babai. This village is situated on the right bank of the Tawa river in the Hoshangabad district and is the centre of a large tract of alluvial soil very suited to the cultivation of garden crops.

About 15 acres of land have been lent by the Malguzar Pandit Jugal Kishore. Purvi til and varieties of groundnuts and chillies are being tried and the Meston plough and Planet junior hoe demonstrated.

III.—Seed farms and seed distribution.

Cotton seed farms.—These were mainly confined to the Nimar district last year, but this year new ones are being opened in the western parts of Hoshangabad. The proprietor does his own cultivation. The seed was obtained from the Akola and Hoshangabad farms and the variety grown was almost entirely rosea, a hardy short stapled variety, which is a good yielder and is characterised by a white flower and deeply cut leaf.

These farms were under the close supervision of the Agricultural Assistant, Khandwa, who had two Kamdars to help him in the busy season.

The best soil is reserved for the seed farms, rogueing is carried out at regular intervals and arrangements are made for separate ginning.

The seed from these farms is placed at the disposal of the department who arranges for its distribution among the large number of cultivators in this district who apply for seed of this variety.

Six seed farms were supervised last year and this number will be considerably increased next year as more seed is now available. For purposes of easy inspection these farms are chosen, if possible, in close proximity to a road or railway.

No.	Name of seed farm.	Owner's name.	Area in acres.	Outturn per acre kapas.	Ginning per cent.	Remarks.
1	Khandwa ...	Totaram Patel ...	10	50	32	Failed owing to the bad season.
2	Palsud ...	R. S. Dajiba, Patel ...	18	221	31	Poor crop owing to late sowing.
3	Rampura ...	Pt. Laxman Balkrishna ...	10	645	38	Early rains and hence sowing was done in good time.
4	Jaswari ...	Thakor Kishoresingh ...	10	150	...	Late sown.
5	Harsud ...	Mr. G. V. Khare ...	10	240	34	The best crop in the neighbourhood.
6	Narsinghpur ...	Mr. Rajaram Dubey ...	35	...	...	

Wheat seed farms—These farms are privately owned and all cultivation is carried out by the owner. Selected seed of particular varieties is obtained from the Government Farm. The crop is carefully supervised by an Agricultural Assistant and rogueing carried out when necessary. Certain simple rules regarding the threshing and storing of crops are also insisted on. In return for this supervision the owner agrees to give the department the first refusal of the surplus seed. Several selected varieties were grown this year. A list of the seed farms in this Division under direct supervision last year is given below :—

No.	Owner's name.	Village.	District.	Variety grown.	Area in acres.	Outturn per acre.	Remarks.
1	Pt. Appaji ..	Palatwara ...	Chhindwara ...	Sukerhai ..	5	800	
2	Pt. Reshamwala ...	Barkalia ...	Nimar ...	Hunsi Pissi ..	7	924	
3	Pt. Anand Rao ...	Patayan ...	Do. ...	Tigharia ...	1	1,300	Irrigated.
4	Kaluram Patel ...	Hirankheda ...	Hoshangabad ...	Sukerhai ...	98	650	
5	Ganpat Singh, Patel ...	Seoni-Malwa ...	Do. ...	Bansi ...	80	800	
6	Madho Rao ...	Undrakhedi ...	Do. ...	Dahutia ... / Sukerhai ...	7 / 5	624 / ...	
7	Court of Wards ...	Baisdehi ...	Betul ...	Do. ... / Bansi ...	100 / 5	... / ...	
8	Pt. Govind Rao ...	Linga ...	Narsinghpur ...	Sukerhai ...	37	...	Ruined by hail.
9	Munshi Raghubir Prasad.	Deonagar ...	Do. ...	Do. ...	40	...	

The surplus produce of the Hirankheda Seed Farm realised Rs. 43 per mani against Rs. 39-6-0, the price at that time of good average pissi in local markets.

Til (*Sesamum*).—The selected variety of maghai til known as purvi is now becoming well established in the Seoni-Malwa tahsil and there are 2,000 acres under this variety in this tahsil alone, while its reputation is spreading rapidly throughout the remainder of the district causing a large number of enquiries for seed.

In the Dharm Khundi Revenue Inspector's Circle, where this variety is firmly established, a local committee has been formed to take steps towards keeping up the standard quality of the seed.

Three Malguzars have set apart areas of up to 50 acres to act as seed farms in which selected seed of the highest quality only is grown and people who have not got seed can get what they require from these farms, which are closely supervised by the department. This committee is to pay a trained man whose main function will be to go round to all the villages in the circle and examine the seed supply of cultivators advising them to get fresh seed when their supply has begun to deteriorate.

An endeavour is being made also to exclude the cultivation of the local brown variety altogether in the villages in this circle and so avoid if possible the danger of rapid deterioration through cross-fertilization. The cultivation of the purvi variety is exactly the same as that of the deshi variety. It however, gives a bigger yield and its quality, which is indicated partly by the seed colour, is much superior. Cultivators now seem to have appreciated the value of co-operation in selling to some extent and the market for this variety is now becoming established in these parts. An enhanced price of as much as Rs. 5 per mani was consequently obtained for the new til in many instances.

Agricultural Associations.—The District Agricultural Associations are now passing through a transition state. They have served a most useful purpose in enabling the officials of the Agricultural Department to get into touch rapidly with local agricultural enthusiasts, but the interest taken in the cause of agricultural improvements rapidly became so great that the need for closer organisation soon became evident. In most districts sub-associations and committees have accordingly been started where condition appeared to be most suitable and the demand most urgent. The first of these Associations to be organised was that for the Seoni-Malwa tahsil which was started two and half years ago. The work done by this association in the introduction of a new variety of til has already been mentioned and this year it will have under its control a number of well organised wheat and cotton seed farms in the improvement of which crops, members are taking an active interest. The work done by this body in getting rid of wild pig has also been singularly successful and in rather more than two years 5,252 pigs have been accounted for, rewards for their destruction amounting to Rs. 2,086-11-6 (raised by private subscription), having been paid. Two other committees have been formed in the Hoshangabad tahsil and are promising well. The head-quarters of the Sohagpur Association have been moved from Semri to Piparia where work on the improvement of wheat and til has been started. This association will keep in close touch with the Co-operative Central Bank.

In Chhindwara a sub-committee of the District Agricultural Association has just been started at Chaorai in the Amarwara tahsil.

The Nimar Agricultural Association has been divided up into Tahsil Sub-Associations each controlling several cotton seed farms.

The Betul Agricultural Association has been transformed into an Agricultural Union. The members have subscribed Rs. 6,000, and have leased a piece of land of about 260 acres in Rohna village close to Betul. The demonstration of improved varieties of crops and of implements will be carried out on a small portion of the land, while the remainder will be utilised as a seed farm for propagating approved varieties already in demand.

It is proposed to dispose of the seed from this farm to members of the union who will propagate it further and eventually dispose of their seed to the Co-operative Societies. The union has also opened an implement depôt at the office of the Betul Central Bank and the members of the Co-operative Credit Societies can obtain loans for the purchase of improved implements and machines from the depôt. The farm is at present being managed by one of the Government

Kamdars until a man who was sent by the Betul Union to the Powarkheda Farm has completed his course of training. Much enthusiasm is being exhibited in this movement by most of the important people in the district from the Deputy Commissioner (Mr. P. Hemingway), who originated the scheme, downwards.

Agricultural Shows.—A show was held at a local fair in each district with the exception of Chhindwara, where it is hoped to initiate one next year.

The Singaji cattle fair was very largely attended and a great deal of business was done in cattle dealing.

The show was well patronised, exhibits being better than last year. As the profits from cattle registration fees are so great it ought to be possible to largely extend the Agricultural Show and to offer more substantial prizes for important crops such as juar and cotton.

The show at Barman fair in Narsinghpur district, which had not been held for three years on account of plague, was well attended and a fair collection of exhibits was brought in.

The Bandrabhan fair (Hoshangabad district) was entirely ruined by rain.

The Malajpur fair in the Betul district was only moderately attended and the exhibits were poor. This place is some distance from Betul and is situated in a poor and jungly tract and is not well suited for a District Agricultural Show.

The Divisional Agricultural Show was held on the Powarkheda Farm on March, 3rd and 4th. Several hundred people attended and although the number were perhaps not quite so great as last year, the interest taken was greater, the great majority of the visitors being Malguzars and substantial tenants.

Messrs. Burn and Company and other firms sent a fine collection of machines for exhibition and the demonstrations were followed with great interest, a keen demand for many implements, particularly Nerbudda reapers and ploughs, resulting. Discussions on cattle breeding and the reorganisation of Agricultural Associations were held and some useful conclusions arrived at. The meeting was visited by the Heir Apparent of Bhopal and the Political Agent and many officials from the districts of the Nerbudda Division. The Commissioner presented medals and sanads to the following persons for good work done in introducing agricultural improvement :—

Medals.

(1) Kaluram, Patel of Hirankheda, Tahsil Seoni-Malwa, District Hoshangabad.

(2) Ganpat Singh, Patel of Banapura, Tahsil Seoni-Malwa, District Hoshangabad.

(3) Thakur Sardar Singh of Sendria, Tahsil Multai, District Betul.

Sanads.

(1) Patel Jugalkishore of Babai, District Hoshangabad.

(2) Patel Balwant Rao Bhide of Khaperkheda, District Hoshangabad.

(3) Patel Madho Rao Harne, Gurmaster Undrakhedi, Hoshangabad tahsil.

(4) Patel Ganesh Vasudeo Khare, cultivator, Harsud, Nimar district.

(5) Patel Rajaram Dubey of Narsinghpur Khas.

The majority of the visitors stayed on the farm and excellent arrangements for the camp were made by Mr. Rambhau Joshi, Extra-Assistant Commissioner, with the assistance of the farm staff.

Court of Wards estates.—The recommendations drawn up for the improvement of the Harrai estate in Chhindwara district have been considered by the district authorities and a start has been made towards carrying them out A Hawaldar receives a short course of instruction in cattle breeding and management. In the Bhainsdehi estate of the Betul district a large seed farm has been started and a man received a short course of training on the Powarkheda Farm to fit him for his duties as sir overseer.

Mr. Nandkishore having been promoted to the Provincial service has devoted most of his time to demonstration work and his local knowledge and experience have proved most valuable.

The Agricultural Assistant, Khandwa (Madho Prasad), carried out his duties satisfactorily and supervised his seed farms well.

In addition the members of the staff at Powarkheda carried out short demonstrations of implements and attended shows at various periods.

I have again to acknowledge the great assistance rendered to the department by the various district staffs and it is gratifying to find so much interest taken in the work of the department, as the encouragement given in this way to the Malguzars and practical agriculturists cannot be properly estimated.

Messrs. Meher Ali and Adhuram Chaudary, Tahsildars in Nimar, and Mr. Gokul Prasad and the Tahsildars of Seoni-Malwa and Harda have devoted much time to this work in addition to their own duties, while space forbids me from mentioning others whose assistance has been almost equally commendable

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Central Provinces.

Report on Agricultural Demonstration in the Jubbulpore Division, for the year 1912-13.

I.—Introductory.

This report deals with the various branches of agricultural work carried out by the department in the Jubbulpore Division apart from the work carried out on the Jubbulpore Agricultural Station, Adhartal, which has been published as a separate report.

II.—Irrigation Demonstration.

The Mahgawan Demonstration Farm was continued for the third year. It now consists of 6·67 acres of inferior sehra soil and was originally intended to demonstrate the effective use of irrigation water from the Barera Kalan. Owing to the unreliable nature of the water-supply in this tank, however, the spread of irrigation cannot at present be advocated until a scheme which is under consideration comes into being and ensures a reliable means of irrigation. The farm has, however, succeeded admirably as a demonstration centre in other respects. The farm was in charge of Shiamley, a local man, who has received a thorough training for three years and is now engaged as a permanent Kamdar as a result of his excellent work.

On the farm itself the cultivation area was reserved to transplanted rice (mainly good early varieties) and the cultivation of groundnuts. In addition five demonstration plots of transplanted rice and one of groundnuts were laid out by the Kamdar and variety trials with two superior varieties of thin canes were carefully supervised in surrounding villages.

The result of the demonstrations on the farm itself are given below:—

A.—Transplantation versus *Machowa (local system).*—Variety basmatia, an early kind.

Method.	Area in acres.	Outturn per acre. lbs.	Remarks.
1	2	3	4
Machowa	1·35	369	Owing to short rainfall in September both plots had to be irrigated.
Transplanted	1·25	979	

In spite of the much better yields of transplantation this method is difficult to introduce owing to the great dearth of labour locally. The transplanted crop is also later and is therefore only being demonstrated this year in areas easily commanded by irrigation:—

B.—Variety test.

Variety.	Area of plot acres.	Yield per acre. lbs.	Value of crop.	Remarks.
1	2	3	4	5
			Rs. a. p.	
Basmatia	1·25	979	30 9 6	Early.
Nasik, early	1·68	565	23 8 8	Early, good quality.
Gurmatia	1·65	1,028	32 2 0	Very late

Gurmatia required several irrigations and was also badly damaged by pig as no late varieties are grown in the neighbourhood. For these reasons late paddies will not be demonstrated again.

Big Japanese groundnut did fairly well but the crop was badly damaged by pig. Rice grown by the cultivators was a failure owing to the unfavourable season and a from 4—5 anna crop only was reaped, the crops on the demonstration farm, although by no means good, affording a striking contrast.

The new canes under trial are khari and sanabille. They require one more irrigation than the local variety but are far superior as regards quality and yield of gur produced. The khari variety appears to be the most suitable as sanabille is more liable to damage by pigs.

Iron sugar cane mills and Meston ploughs were demonstrated and 26 of the former and six of the latter were purchased locally by cultivators from the Kamdar. The whole of the surplus stock of selected seed of this farm amounting to 1,180 lbs. (mostly early paddy varieties) was purchased by cultivators in the immediate vicinity at enhanced rates.

Jarwahi.—The Mahgawan Farm has proved so successful that an area of some 12 acres has been lent by the Malguzar of Jarwahi (Rai Bahadur Behari Lal, Khazanchi,) and a demonstration farm on similar lines to the above has been opened in charge of another Kamdar. The village is close to Niwar Station in the Murwara tahsil and is commanded by the Piprodh tank.

Roomal.—An attempt was made to open a demonstration farm in the area commanded by this large tank. Owing to the indifference and hostility of the local people, however, suitable land could not be obtained. A plot of cane of different kind was put down on land belonging to the Malguzar of Mohburra, but he neglected the crop and it was partly destroyed by grazing and over-irrigation before the damage was reported. The mistrust in these parts is due to a rumour which has been spread abroad that Government intends to acquire the commanded area and convert it into a Central Sugar Factory.

Other demonstration farms will, I hope, be opened under other promising tanks in this division in the near future as staff becomes available.

III.—Other Demonstration Farms apart from irrigation.

Seoni-Chhapara.—A small piece of land was kindly lent to the department by Dadu Vishwanth Singh, Honorary Magistrate, in mouza Manglipet, close to the Seoni Railway Station. Variety tests were carried out with a number of selected wheats. Results are given in the statement below :—

No.	Variety.	Yield per acre. lbs.	Remarks.
1	Sukerhai pissi ..	469	An uneven plot with poor soil.
2	A 0 12 ..	812	Tillered well.
3	A 0 49 ...	714	Poor soil.
4	A 0 50 ...	882	
5	Pussa 4 ...	494	
6	Howrah ...	873	
7	Tighariya	896	
8	Bansi ...	574	Some kans grass in the plot which affected the yield.

The plots were one acre each. The soil, Morand II, is fairly typical of the inferior thin black wheat soils common to the Satpura districts. Nos. 2, 3, 4, 6 and 7 are all early ripening wheats, the two latter being durums. All hard wheats showed a tendency to soften last year, Pusa 4 being particularly noticeable in this respect and consequently yielding a poor-looking sample.

Tighariya is a hard yellow durum wheat which is very early ripening and may have a future in this tract as it is more valuable than the inferior red durums now grown in places. A number of selected types of early cottons is being grown in this village during the current kharif season.

This farm is in charge of an Agricultural Assistant who also carries out demonstration work in the three adjoining districts. A few useful implements such as monsoon and Meston ploughs, etc., are kept in stock at this farm as a demand is beginning to develop.

Rai Bahadur B. D. Shukul has opened a private demonstration farm at Mansakra close to Sehora. Varieties of rice, wheat and groundnuts and useful implements such as Meston and monsoon ploughs, cultivators and winnowers are demonstrated and in every day use. This farm is in charge of a Kamdar who was trained on the Government Farm but who is in the employ of Mr. Shukul and the whole farm is closely supervised by the department.

Small demonstration farms on these lines have been opened this year at three places in Mandla district:—

Village Benaika	...	... Pandit Hardayal
„ Amadongri	...	... „ Indra Lal Ojha.
„ Hirdenagar	...	... The Agricultural Sub-Committee.

They are being directly supervised by the Department and Kamdars intended for each farm have been sent for training to Adhartal.

IV.—Patan Demonstrations.

Demonstration of the sowing of cotton and juar in lines in the Kanthar villages and inter-cultivation by the bullock hoe were continued.

The season for these kharif crops was not favourable, but owing to inter-cultivation the crops sown in lines were superior to those sown by the local broadcast system.

Two trained Kamdars from the Hoshangabad Farm were sent and they each had charge of a circle of five villages each on which areas of up to six acres were sown with the help of local cultivators.

In the two previous years several other villages had been demonstrated in, and the Agricultural Assistant was told to notice what effect these demonstrations had made. As a result, out of twenty-seven villages in which demonstrations have been carried out, in only six does the new method really seem to have caught on. In six others the system is still practised in a haphazard way and in the others the local method has been reverted to. It is noteworthy, however, that in all these villages where this method has not been continued, the demonstration plots owing to the indifference of the local people had been very small, often less than an acre, and the full benefit of the drill system is very difficult to demonstrate on such small areas. Accordingly a change of policy has been decided on and instead of demonstrating in a large number of villages in small areas a few villages with large areas have been chosen for this year's programme. Demonstration farms have been opened in charge of Government Kamdars on land lent by the Malguzars (who also provide the bullocks) in the following villages: —

Natwara	..	... D. B. Seth Ballab Das.
Kuwakheda	...	... Pandit Ram Prasad.
Barbatee	...	... Rao Bahadur Behari Lal Khazanchi.
Sawanpura	...	... Thakor Sobha Singh.

The Agricultural Assistant will also give assistance in the villages, below mentioned, where the method proved succesful last year and in which the people have promised to sow a larger area this year:—

Malguzar.

Barhaiya Kheda	...	... Rikhiram Patel.
Dundee ..	...	... Keshore Singh.
Jatma ...	...	.. Gotia.
Karhaiya Khurd	...	.. Foujdar Arjun Singh.
Reonza ...	...	... Manrakhan.

Cholera has been prevalent in these Kanthar villages during the past hot weather and for this and other reasons labour is becoming so scarce that there is a good chance for the new method, which saves much hand weeding.

At Bakhari, a village in the Chhapara tract of the Seoni district, a large quantity of the variety of early cotton known as tissera has been selected and will be sown this year. This cotton gave a ginning percentage of 38, expenses will be borne by Pandit Jiwan Lal, the Malguzar.

V.—Seed Farms.

Owing to the great demand for selected wheat seed, a number of private seed farms have been organised. The owner of the seed farm, who is generally the Malguzar but sometimes a well-to-do tenant, obtains his seed from the Government Farm, in the first place taking seed for an area which is not less than 20 acres as a rule. The land for the seed farm is first approved and he agrees to carry out certain simple rules with regard to the growth, harvesting and storage of the crop, which are necessary in order that the seed may be kept pure. In return for the supervision and advice given, the Malguzar agrees not to sell his surplus seed in the market without first consulting the Department. As a matter of fact for the first two or three years he finds no difficulty in disposing of all his surplus seed to malguzars and cultivators in the neighbourhood at enhanced rates. The surplus produce of the Court of Wards seed farms at Seoni, for instance, was valued by Messrs. Ralli Brothers at 2 annas a maund, higher price than the very best wheat coming into the local markets at that time. On this result being known orders for 420 maunds were at once received for sowing purposes and it is anticipated that the whole will be purchased by local cultivators. Any seed farm which does not give produce up to sample in the matter of purity is at once struck off the list of seed farms and its produce is no longer guaranteed by the Department.

The varieties mainly propagated on these farms are sukerhai, a superior soft white variety, and bansi, a hard yellow macarni wheat.

Forty-two seed farms with a total acreage of some 2,400 acres were supervised by the Department. These seed farms were grouped into three circles each in charge of an Agricultural Assistant. A list showing details of situation area, etc., is given below:—

List of private seed farms supervised by the Department in the Jubbulpore Division, during the year 1912-13.

No.	Proprietor.	Village	District.	Variety.	Average.	Outturn per acre.	Remarks.
1	2	3	4	5	6	7	8
1	R. S. Gurudin Misra ...	Baragawan ...	Jubbulpore ...	Sukerhai Bansi Malida gram	740 40 20	810 900 390	(Wilt disease halved the outturn)
2	R. B. B. D. Shukul ...	Barkheda ...	do. ...	Bansi ..	60	720	
3	Do. ...	Pathrewa ...	do. ...	Sukerhai ... Murya ...	60 15	540 560	

List of private seed farms supervised by the Department in the Jubbulpore Division, during the year 1912-13.—(Concld.)

No.	Propritor.	Village.	District.	Variety.	Average.	Outturn per acre.	Remarks.
1	2	3	4	5	6	7	8
4	R. b. B. D. Shukul ...	Mohania ...	Jubbulpore ...	Sukerhai ...	60	500	Partly rusted.
5	Do. ...	Ponda ...	do. ...	do. ...	60	450	Damaged by rust.
				Murya ...	32	630	
6	Pt. K. V. Phansey ...	Simaria ...	do. ...	Sukerhai	50	400	Light soil and damaged by hail.
				Bansi	15	420	
				Hansi Pissi	1	700	
				Malida gram	4	540	
7	Pt. Jamuna Prasad Khamparia.	Deori ...	do. ...	Sukerhai	200	650	(Will disease.
				Malida gram	10	300	
8	R. B. Seth Jiwandas ...	Budhara ...	do. ...	Sukerhai ...	500	500	Late sown.
9	Beohar Raghubir Singh...	Kajjarwara ...	do. ...	do. ...	20	600	
10	Nandlal Rao ..	Patan ...	do. ...	do. ...	12	...	
11	Sheoprasad Guru ...	do. ...	do. ...	do. ...	15	...	
12	Arjun Singh Foujdar ...	Debi Surayia...	do. ...	do. ...	48	600	
13	Do. ...	Natwara ...	do. ...	do. ...	22	733	
14	Do. ...	Sahasan ...	do. ...	do. ...	20	600	
15	Manrakhan ...	Renza ...	do. ...	do. ...	8	...	
16	Seth Kashi Prasad Safar.	Hada ...	do. ...	Sukerhai	60	...	Rejected.
				Bansi	7	...	
				White linseed	50	...	
17	Do. ...	Khamod ...	do. ...	Sukerhai ...	48	...	do.
18	Do. ...	Hardua ...	do. ...	do. ...	10	...	
19	R. B. Seth Jiwandas ...	Timri ...	do. ...	Sukerhai ... Itarsi seed.	20	550	
20	Do. ...	Mangela ...	do. ...	do. ...	50	...	
21	R. B. Seth Jiwandas ...	Surtalai ...	do. ...	Sukerhai Itarsi seed.	60	...	
22	Do. ...	Pondi ...	do. ...	do. ...	10	...	
23	Do. ...	Sahajpur.. ...	do. ...	do. ...	120	...	
24	D. B. Seth Ballabhdas ...	Sehoda ...	do. ...	Sukerhai ...	50	...	
25	Pt. Raghunath Rao ...	Burkhera, ...	do. ...	do. ...	15	...	
26	Thakur Makhan Singh ...	Mungwani ...	Seoni ...	do. ...	78	...	
27	Pt. Jeewanlal ...	Khairee ...	do. ...	do. ...	30	...	
28	Dadu Kushiram ...	Datni ...	do. ...	do. ...	100	...	
29	Dewan's Courts of Wards.	Samnapur ...	do. ...	do. ...	50·5	...	
30	Do. ...	Lunsa ...	do. ...	do. ...	18	...	
31	Do. ...	Burhena ...	do. ...	do. ...	23	..	
32	Do. ...	Aminganj ...	do. ...	do. ...	17·5	...	
33	Do. ...	Malara ...	do. ...	do. ...	48	...	
34	Dimakudas ...	Delha ...	Mandla ...	do. ...	70	...	Crop damaged by rain.
35	Pt. Sheo Prasad ...	Hirdenagar ...	do. ...	do. ...	5	...	
36	Pt. Hardayal ...	Benaika ...	do. ...	do. ...	35	...	Very good outturn.

N. B.—Six other seed farms on small areas, which were supervised by an Agricultural Assistant in Second and Mandla districts, have now been abandoned through lack of interest on the part of the owners.

The total area under seed farms in this division during the year under report is approximately 2,400 acres.

VI.—Agricultural Associations.

The District Agricultural Associations were first formed when the Department was young and their main functions were to advertise the Department and to enable the officers of the Department to get in touch with some of the leading malguzars and agriculturists. These objects have been attained but with the increasing interest in agricultural matters, which is everywhere noticeable in this Province and is particularly evident in parts of this division, it is becoming evident that in order to introduce the new methods much smaller units than the District Agricultural Associations are necessary.

This tendency towards forming smaller Associations is very marked. Thus the Jubbulpore District Agricultural Association has sub-committees at Sehora and Patan, and groups of willing cultivators who are interested in the small demonstration farms at Mahagwan and Jarwahi could easily be organised if it were necessary.

In Mandla two of these committees have just been formed at Banaika and Hirdenagar. Each committee has a little farm in which varieties of rice are being tested and trials are also being made with early cottons, groundnut and Meston ploughs.

Two men have been selected by these committees and are now under training at Adhartal Farm. They will return at the end of one year to act as the Kamdars of these respective committees.

Similarly it is proposed to form three committees in Seoni —

(1) At Bakhari near Chhapara, which will interest itself mainly in trying varieties of early cottons and where about one hundred acres of selected cotton have been sown this year.

(2) At Malara centering round the demonstrations carried out on the Court of Wards estate.

(3) At Seoni itself, which will mainly interest itself in the improvement of the wheat crop.

The programme includes —

(1) Single seedling transplantation of paddy.

(2) Green manuring of paddy.

(3) Introduction of winnowers, monsoon and Meston ploughs.

In Damoh and Saugor little has yet been attempted owing to shortness of staff but a sub-committee has just been formed at Rehli and a plot of land obtained for a demonstration farm. Improved cotton and wheat varieties will be tested and the sowing of kharif crops by the drill advocated.

At Sehora, where the co-operative credit movement has made great strides, matters are on the whole progressing favourably. Much admirable work in such matters as the testing of new varieties of dhan, wheat and gram and the demonstration of new implements has been carried out by R. S. Gurudin Misra, Pandit Kesho Rao and others, while Rai Bahadur B. D. Shukul has opened a demonstration farm near Sehora which is in charge of a man trained on the Adhartal Farm.

As a result of these trials and demonstrations there is a large demand for certain seeds and implements which the Department is unable to fully supply.

The seed store has been reorganised. The grain dealing business has been separated off and is now being carried on as a private concern. The office of the Pure Seed Supply has been transferred to the new building of the Central Bank and members can inspect the new seeds advocated and try improved ploughs and implements for themselves on the spot. Orders for these can be

registered at the Bank building itself and, if necessary, loans obtained for the purchase of improved seeds or implements. An Agricultural Union composed of seven rural societies has been organised with head-quarters at Bargawan, R. S. Gurudin Misra being President. Each rural society appoints one of its members to act as Kamdar and his duty is to see that members who grow pure seed carry out certain simple rules which ensure that it is kept pure. In addition at a meeting held twice a year he sends in an estimate to the President giving the approximate demand for seed from his society and also states what surpuls is likely to be available for sale.

Other unions on these lines will also be shortly organised.

VII.—AGRICULTURAL SHOWS.

Demonstrations were carried out at the following fairs :—

(1) Jubbulpore Divisional Show at the Adhartal Farm.
(2) Mundara fair ... ... Seoni District.
(3) Mandla ... ... Mandla ,,
(4) Bandakpur fair ... ... Damoh ,,
(5) Garhakota ... ... Saugor ,,

The Divisional Agricultural Show was held on the 14th and 15th February. The first day was well attended in spite of the inclement weather but the second day was entirely ruined by heavy rain and the prizes were given away by the Hon'ble the Chief Commissioner in the Town Hall.

The subjects discussed at the Conference dealt with agricultural co-operation and malguzari cattle breeding farms respectively. The Jubbulpore District Show took place at the same time instead of being held at Bheraghat as has been the case in former years. A fine collection of exhibits were sent in by local cultivators, the rices and wheats being particularly good. Five large silver shields were presented for annual competition open to the whole division, and a fair list of entries was obtained taking into consideration that this is the first year of the competition. The donors' and winners' names are given below :—

Crop competed for.	Donor.	Winner, 1913.	Address of the Winner.
Soft white wheat ...	D. B. Seth Ballabhdas ...	R. S. Gurudin Misra ...	Bargwan, Jubbulpure District.
Gram ...	R. B. Seth Jiwandas ...	R. B. Bishan Dutt Shukul.	Sehora, Jubbulpore.
Groundnut ...	D B. Kastur Chand Daga ...	do. ...	do.
Sann hemp ...	Pt. Jiwanlal, Bakhari ...	Dadu Bakhtawar, Seoni ...	Seoni.
Early paddy of best quality.	Beohar Raghubir Singh ...	Pt. Kesheo Rao Phanse...	Simaria, Jubbulpure.

Messrs. Hooley and Evangelenidis (Ralli Brothers) kindly assisted in the judging.

Sir Benjamin Robertson presented medals and sanads for good work in agricultural improvement to the following gentlemen :—

Medals.

Seth Ardeser Rustumjee ... Sehora, Jubbulpore District
Pt. Kesheo Rao Phanse ... ,, ,, ,,
Thakur Arjun Singh Fouzdar, Debi Suriya ,, ,, ,,
Dadu Vishawanath Singh ... Seoni Chhapara.
Pt. Jiwanlal of Bakhari ... District Seoni.

Sanads.

Rao Ajmer Singh ... ... Ghoogra Kalan, District Damoh.
Pt. Jamuna Prasad Khamparia ... Khitola, District Jubbulpore.

The Mundara fair was ruined by the rain in November and the Bandakpur fair by hail. The latter is now-a-days poorly attended and little interest seems to be taken in it. A movement is on foot to make the Garhakota fair the scene of a great annual Agricultural Show for the two districts of Saugor and Damoh. This fair is the site of an important cattle market and great interest has been taken in the Agricultural Show during the last three or four years.

The Mandla Show was well attended and the exhibits promising, but the site will be transferred next year to Hirdenagar, where a large religious fair is held annually.

VIII.—Court of Wards.

The Dewan's Court of Wards estate in Seoni district continues to do excellent work. The whole of Malara village was transplanted with single seedlings and considerable areas in the other four villages. Green manuring for paddy was not markedly successful probably because of the late season. The wheat seed farms gave fair yields and in the home-farm area nothing but selected Sukerhai is now being sown. Surplus stock this year was in great demand from local Malguzars for sowing purposes.

The Meston and monsoon ploughs have both given good results and the winnower is also regularly used in Court of Wards villages.

The Hawaldar trained on the Raipur Farm is turning out well and another will be sent to Adhartal Farm for training this year.

IX.—Staff.

Laxmi Narayan Dubey was in charge of all demonstration work in the Sehora, Murwara and part of the Jubbulpore tahsils. He has shown great tact and intelligence in carrying out his duties and his work has proved most valuable.

G. V. Bapat was in charge of the rest of the district and has done a great deal of hard useful work.

Ambardeker was stationed with head-quarters at Seoni, where an assistant has long been required to cope with the growing interest shown by the people in parts of Mandla, Seoni and Chhindwara districts.

In addition I have again to acknowledge the assistance given by the District officials whose interest in the work of the Department has been most gratifying. Messrs Wali Mohamed and Chattersingh have done much in the Seoni district, Mr. Purshotamdas Kataria, the Deputy Inspector of Schools, has done much to introduce the cultivation of groundnuts and other crops in culturable parts of Mandla and R. B. Annant Lal and Mr. Mian Bhai have organised the scheme at Jubbulpore and Garakhota respectively with conspicuous skill.

G. EVANS,

Deputy Director of Agriculture,

Northern Circle, Jubbulpore,

Central Provinces.

Govt. Press, Nagpur:—No. 1034, Dir. of Agri.—7-3-14—500.

APPENDIX.

GLOSSARY.

Botanical, English and Vernacular names of Crops, etc.

Botanical.	English.	Vernacular.
Cereals.		
Triticum sativum ...	Wheat ...	Gehu, gahu.
Andropogon Sorghum var, vulgare...	Great millet ...	Juar (jowar).
Oryza sativa ...	Rice ...	Dhan.
Zea mais	Maize ...	Makka, makai.
Pasoalum scrobiculatum ...	(None) ...	Kodon.
Panicum psilopodium ...	(None) ...	Kutki.
Pennisetum typhoideum ...	Bulrush millet ...	Bajra.
Fodder crops.		
Sorghum amber ...	Sorghum ...	*Nil.*
„ collier ...	...	
„ sundia ...	...	
Trifolium alexandrium ...	Berseem ...	*Nil.*
Fibre plants.		
Gossypium neglectum ...	Jari cotton ...	Varadi Kativilayti.
„ indicum ...	Bani „ ...	Bani.
„ hirsutum ...	American cotton ...	Buri.
„ barbadense ...	Egyptian „ ...	*Nil*
Crotolaria juncea ...	Bombay hemp ...	San.
Agave (varieties) ...	Aloe ...	Khekti.
Sisalana ...		
Vivipara ...		
Saharanpore ...		
Furcroea gigantea ...	Mauritius hemp ...	Khekti.
Corchorus capsularis ...	Low-lying jute ...	Pat.
C. olitorius ...	High-lying „ ...	
Hibiscus cannabinus ...	Dekkan hemp ...	Ambari, patwa.
Pulses.		
Cicer arietinum ...	Gram ...	Chana
Cajanus indicus ...	Pigeon pea ...	Tur, arhar.
Dolichos lablab ...	Indian bean ...	Val.
„ biflorus ...	Horse gram ...	Kulthi.
Pisum arvense ...	Peas ...	Batra, batana.
Lathyrus sativus ...	Chickling vetch ...	Lakh lakori, teora.
Ervum lens ...	Lentil ...	Masur.
Phaseolus mungo ...	Green gram ...	Mung.
„ radiatus ...	(None) ...	Urad.
Vigna catiang ...	(None) ...	Chauli, barbati.
Oilseeds.		
Linum usitatissium ...	Linseed ...	Alsi, Jawas.
Sesamum indicum ...	Sesamum ...	Til, tilli.
Carthamus tinctorius ...	Safflower ...	Kusum, kharad.
Ricinus communis ...	Castor ...	Andi, arandi.
Brassica juncea ...	Mustard ...	Sarson.
Arachis hypogœa ...	Ground-nut ...	Mung-phalli, bhuimung.
Sugar.		
Saccharum officinarum ...	Sugarcane ...	Santa, us.
	Jaggery ...	Gur.
Vegetables.		
Ipomaea batatas ...	Sweet potato ...	Kand, shakarkand, ratala.
Trapa bispinosa ...	Water chestnut ...	Singhara.
Spices.		
Coriandrum sativum ...	Coriander ...	Dhania.

Botanical, English and Vernacular names of Crops, etc.—(Concld.)

Botanical.	English.	Vernacular.
Grasses.		
Saccharum spontaneum ...	Nil ...	Kans.
Andropogon punctatun ..	Nil ...	Kunda.
Cynodondacaylon ...	Couch grass ...	Dub.
Weeds.		
Cyperus searious ...	... ...	Nagarmotha.
Sesbania aculeata ..	... ...	Sawri.
Alysicarpus monilifer ...	... ...	Shevra.
Trees.		
Melia azadirach ...	... ...	Nim.
Bassia latifolia ...	... ...	Mahus.
Terminalia tomentosa ...	... ...	Saj.
Silk.		
	Silk worm ...	Tassar.
	Castor silk worm ...	Eri.

Local Agricultural terms—

Bakhar—A kind of blade harrow used as a substitute for the plough and also for preparing the seed bed.

Bisi—The rice seed is sown broadcast and when the seedlings are about 9 inches high, the land is ploughed again at right angles to the direction of the furrows in which the crop was sown, the young seedlings being thus uprooted and thinned.

Lehi—Is the method of sowing broadcast with artificially germinated seed.

Birra—A mixed crop but usually refers specially to the wheat-gram mixture which is the common rabi crop of the northern districts.

Tifan—A drill plough.

Argada—A small weeding plough.

Khardi—The stalks and leaves of *juar* used as fodder.

Rabi—Crops sown in autumn and reaped at the end of the cold weather.

Kharif—Crops sown at the beginning and reaped at the end of the rains.

Kanhar—Dark clayey loam soil.

Wardi—Light sandy loam soil.

Morand—A soil similar to Kanhar but usually slightly lighter texture.

Utera—A second crop after rice, which is sown in the wet fields among the rice stems.

Kapas—Unginned cotton.

Bojha—A bag of unpressed cotton.

Ghi—Clarified butter.

Bari—A small garden.

Pulla—A bundle, usually of fodder.

Bhusa—Straw and chaff broken up together.

Khedda—An enclosure for the capture of game.

Datari—A log with wooden teeth fixed in it and used as a harrow.

Kopar—A log used for crushing clods.

Bir—An area reserved for the growing of grass.

Govt. Press, Nagpur :—No. 1034, Dir. of Agri.—30-3-14.—500.

REPORT

ON THE

AGRICULTURAL STATIONS

IN THE

CENTRAL PROVINCES AND BERAR.

FOR

THE YEAR 1913-14

Ending the 30th June 1914.

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Report of the Agricultural College, Nagpur, Central Provinces, for 1913-14, by Robert G. Allan, Esq., M.A., Principal.

THE COLLEGE REPORT FOR 1913-14.

The staff.

The only alterations of note in the staff and its division of work have been the replacement of Mr. Pandit by Mr. Ranganath Rao in the Botanical Section; the latter is an old student who, after some years of experience in Mysore, has returned to this Department, and the replacement of Mr. Roy by Mr. Abdul Rahman, as Veterinary Assistant. In other respects the staff and its work are as in the previous year. The Principal and the Economic Botanist, owing to other calls on their time, have perhaps been unable to give so much individual attention to teaching.

WORK THROUGHOUT THE YEAR.

Agricultural Section.

General.

2. The first and the third year courses are those given in the last report. The second year has had some slight variation, induced by the increase of botany and chemistry. The practical work has been much as in the past, but the lecture and class periods were reduced, in anticipation of the much bigger allotment arranged for the students of this year, when they pass to the third year course in 1914-15. Less of the subject has thus been covered. The work of the third year in the field, I consider, has been rather above the average. There were, of course, two or three exceptions, but I have seen more keenness than usual and more private effort. I do not consider the second year a good one. There are some keen and active men, but there appears to be less interest. The cultivation I have noted in this private plots has not been of the same level as in past years. This is perhaps, however, to some extent traceable to less satisfactory times of day allotted and to the greater calls made on their time by the more scientific subjects. I expect to remedy the defect by the concentration intended on agriculture next year, though my absence on leave will, I am afraid, tell to some extent on the efficiency with which this new course is carried on. The first year contains several capable men and a very fair proportion of good workers. There has been no lecturing in the course, all the work is done in the field, either practical or observational. Mr. Pathak has been entirely responsible for this class and it will be interesting to see in examination how far he has maintained the heuristic line of teaching, as opposed to the process of stuffing with undigested facts and unnecessary knowledge.

Botanical Section.

General.

3. During the year three classes were trained in the Botanical Section. The first year class was taken mainly by Mr. Ranganath Rao, while the second and third years' classes were taken by Mr. Kalka Prasad. Owing to the introduction of the new curriculum by which the teaching in botany is concentrated in two years, it was possible to combine a large part of the lecture course of the second and third years. This saved a good deal of the Lecturer's time. The first year consisted of 15 sudents. With one or two exceptions they were a hard-working lot, attentive during classes and putting in extra work on holidays. The examination showed proof of this in that more than half the class scored over 60 per cent.

Second year.—This was on the whole a good year. The progress made under the new curriculum was as good as that under the old, as shown by 13 out of 15 students passing in the final. The great advantage in the new concentrated curriculum is that the students' interest never flags as formerly, owing to the interval of some days between classes in the same subject. The third year consisted of 15 students and is the last year to be taught under the old curriculum. The class was an average one. Only one student failed in the final examination.

As pointed out in last year's annual report, the amount of time that the Economic Botanist can devote to the college work is becoming more limited through the increase of the other work in the section. During the present year, in addition to general supervision of the practical classes, a special course of lectures was taken on plant breeding. The teaching work has been well carried on by Messrs. Kalka Prasad and Ranganath Rao.

Chemical Section.

General. 4. Owing to a re-arrangement of the college time-table, the chemistry course has now to be finished within the first two years. This has necessitated the giving of fifty per cent more time to the subject in the first and second year classes. In the future no instruction will be given to the third year. The examination papers given to the second and third years were both set by Mr. W. H. Harrison, Agricultural Chemist to the Madras Government.

First year class.—This class did a very satisfactory year's work and had evidently obtained a good grip of the subject. At the final examination only two men were below pass standard.

Second year class.—This class attended lectures in both organic and agricultural chemistry, as, owing to the above-noted change in the college time-table, they had to cover more ground than has been the case in previous years. They may be considered to have put in a year's hard work at the final examination; four passed in the 1st class, seven in the 2nd and there were two failures.

Third year class.—This class was one of fairly even merit all through and at the diploma examination four obtained a 1st class, eight a 2nd class and one failure. The external Examiner's report on the second and third years classes was as follows:—

"In both papers the students have shown a good general knowledge of the subject and the only point which I consider calls for comment is the indifferent spelling of chemical and technical terms. It would materially improve the standard of the answers, if this point received attention in the future.

Minor Subjects Section.

5. *Physics, first year.*—This subject was not grasped so readily as was the case with chemistry. As pointed out in previous years, to make the best use of laboratory work it should be recorded and written up in the laboratory at the time it is carried out. Our present accommodation does not allow of this and the value of the work is lessened in consequence.

Entomology. This has been in charge of Mr. Khare. His monthly reports on the second and third year, to whom this subject is taught, do not indicate that the classes have been up to last year's standard. Mr. Fletcher, Imperial Entomologist, as will be noted under the head of examination of this subject, is of the opinion, however, that the Lecturer has failed to give the third year, at any rate, sufficient real field work or taken the steps indicated by him in the past to make the subject of practical utility.

Veterinary. The second year this session had a course of elementary animal anatomy and physiology, preparatory to their course of veterinary, now confined to the third year. The third year had the same course as in past years. The present Veterinary Lecturer has shown a keen interest in the practical and demonstrational side of his work and I am of the opinion that the third year class should be better prepared than most. Considering the fact that students have frequently to handle animals in the course of farm work, several appear to show a marked timidity in the way they approach them in the Veterinary Classes.

Survey, mensuration and mathematics. The first year are chiefly employed in the last two and the second year in the first of the subjects in the margin. The course has, I think, improved and the increase of time allotted in the first year has helped to strengthen what is not infrequently a weakness.

Engineering.

In addition to a course of a more mathematical character, given at the college, there have been two short courses, one in farm building and estimates and the other on machinery. The last named will be extended in length during the next session. The short course of practical machinery was given by Mr. Cove of the School of Handicrafts.

General.

6. From 1914-15 the college classes will be entirely on the new sytem first introduced in 1912-13, and reported there.

The third year will in future devote themselves to agriculture, veterinary and Engineering. Under the latter I will include survey. I believe that on the completion of this year they will be better fitted in after years in these three subjects of direct importance than on the older system. I must, however, state that, for men of the matriculation standard of education, a course on the lines to be adopted at Coimbatore and, at any rate as far as the early part is concerned, at Lyallpur and Sabaur, appears in many respects desirable. This course referred to is one of four years. The first two years are devoted to agricultural and practical subjects and to an improvement of the knowledge of English; the second two years to the more scientific aspects. The second part would only be taken by men qualified to do so in part one. This is in a sense the converse of the system here, where we tend to an elementary knowledge of the sciences first, accompanied by some practical agriculture and concentrate on the more practical side later. The Coimbatore type allows of a larger field of recruitment and gives an agricultural course in the first two years which might be suitably termed a 'Farmers' course' and sufficient for the wants of any man who merely intends private farming, estate management and the like. A non-matriculate might be admitted without acting as a drag on the class. To meet these in the Central Provinces and to maintain our present college course, which is, I think, suitable for men of averagely smart intellect, we should include a two years' 'Farmers' sons' course' in the college scheme. I propose to attempt this course in addition to the college degree course on my return from leave.

Conduct and discipline.

I have no remarks to make. Both have been satisfactory.

Tours.

The third years' students visited Raipur, Sindewahi, Akola and Hoshangabad during the past year.

College buildings and fittings.

7. I have little to report under this head. The laboratory still continues to crawl towards completion; but progress has been painfully slow. Till this is in working order, no steps can be taken in fitting the present chemical laboratory as a college hall—a room which is a much felt want. I have, however, made budget provision for next year for the steps needed to make it satisfactory. This room and the class rooms of the college have been fitted with fans and lights as each require. New bench fittings have been provided in one class room and new black boards in all.

The servants' quarters connected with the hostel have been completed, as has also the second tennis court. Some steps have been taken towards laying out the area in front of the college and the hostel. It is hoped that with the extension of the pipe, now completed, the remaining beds will be laid down by the Garden Superintendent during the coming monsoon.

It has been decided to lay out the area between the college buildings and the nala as a small orange garden. This will be an effective method of dealing with an otherwise unsightly area.

College students.

8. The entry this year has not been of a very satisfactory type, though several of the men admitted are fairly promising. Some 32 students were selected and granted admittance from the applying candidates. The number of these was smaller than in the last year

or two and did not contain so many possible men. Of this number the year eventually started with eighteen. The numbers in each year are stated below:—

	At the beginning of year.	Appeared for examination.
First year	18	15
Second year	13	13
Third year	15	13
Total ...	46	41

The three losses in the first year were caused by resignation, one on account of health and the other two of incapacity to grasp the subjects. In the third year both the absentees studied to nearly the end of the session, when the health of one broke down and the other was withdrawn by his relations on account of some family matters. A steady entry of 25 to 26 men in the first year is necessary, so as to maintain the number we consider desirable in the two succeeding years.

The following table affords an analysis of the areas whence students are recruited:—

Year.	The Central Provinces and Berar.	Central India.	United Provinces and Bengal.	Other places.	Total.
First year ...	15	2	...	1	18
Second year ...	9	1	...	3	13
Third year ...	9	1	2	3	15
Total ...	33	4	2	7	46

This is not by any means an entirely satisfactory state of affairs. It is difficult to say what the falling off in numbers during the last two years is due to. In 1912 the type of applicant and the numbers who applied were particularly good, though the actual numbers, who eventually were definitely placed on the books as students, were only eighteen. In 1913 the number applying and type who did so were on the whole inferior. To some extent I think the lack of definiteness in the extent of the cadre of this department and the eventual prospects intended, is responsible. There is, however, almost assured employment for any man who passes, not only in this department, but outside it. I have had as many as eight to nine applications during the past year for trained men from private land-owners. In a year or two we shall have applications coming in from Cotton Unions and Co-operative Societies for men. The supply is at present far short of the demand. I have attended two meetings in the north of the Central Provinces, *viz.*, Hoshangabad and Burman Fair, with some success. I am of the opinion that the Principal should be informed of all Agricultural Association Meetings in both the north and south of the Province and should attend as many as he can. Agricultural education formed one of the principal subjects at the Hoshangabad Divisional Meeting this year and two or three likely candidates were interviewed by me afterwards. The Co-operative Credit Banks in the north of the Central Provinces have undertaken to act as the centres of distribution of information about the college. There were indications that a two-year agricultural course would meet with support.

The sanctioned scheme of scholarships to permit of the sons of genuine agriculturists taking the high school courses and the matriculation, so as to qualify for the college, is, I think, likely to permit of a good selection of men of the right sort for service in this department. The college, however, cannot

maintain itself or the department its staff requirements on these alone. As I have stated, I anticipate a rapid increase in demand in a year or two's time. The present difficulty lies in getting the possibility of this demand realized now, so that men to meet it will be forthcoming. I can think of no means other than the attendance of the Principal at Agricultural Meetings and the broadcasting of the information about the college by the help of the Education Department and the Head Masters of High Schools and Middle Schools and by the aid of Co-operative Credit Banks. With reference to assistance by Head Masters, I beg to commend the active assistance which the Head Master of the High School, Hoshangabad, attempts to give in this respect. It is possible that, when the Principal is given charge of a small district, this will help in getting men, as his personal influence when on tour would be directed towards this end.

The examination of 1914. General Remarks.

9. These examinations were held this year between the 10th and 21st of March. The earliness was partly to permit arrangements of exchange of examiners with other colleges and partly to permit of my completing before taking leave. In past years we have taken the end of the month and other colleges the earlier period.

Examiners.

The college examinations were carried through with the help of the following external examiners in addition to local assistance. Mr. J. B. Knight of Poona in agriculture, Mr. M'Crae (Madras) in botany, Mr. Harrison (Madras) in chemistry, Mr. Bainbrigge Fletcher (Pusa) in entomology, Major Dawson (Superintendent, Civil Veterinary Department, Central Provinces) in veterinary.

External examiners in botany and chemistry examined in both the third and second years this year, as on the lines of the present curriculum the finals of chemistry and botany occur in the second year. The present third year were on the old curriculum and were examined as in the past.

RESULTS.

First year.

Total examined.	1st Class over 60 per cent.	2nd Class over 50 per cent.	3rd Class over 45 per cent	Failures.
15	4	7	...	4

One student was a hopeless failure and will not be re-admitted. The two others are agriculturists and represent two non-matriculates admitted on trial. They fail in scientific subjects and mathematics, chiefly due to lack of sufficient elementary educational training. Given that they repeat this year, I fancy both would eventually succeed. Two of the first class students are very much in advance of the rest. Taking the subjects in detail, they may be expressed in tabular form :—

	Total examined.	1st Class.	2nd Class.	3rd Class.	Failures.
Agriculture ...	15	6	7	1	1
Chemistry ...	15	3	7	3	2
Botany ...	15	7	5	2	1
Minor subjects ...	15	3	7	1	4

Agriculture was on the whole done well. Most of the class shaped well in the field tests and appeared to possess an intelligent knowledge of what they had done and seen during the year.

Chemistry.—The students of this year have given more time to chemistry and have covered more ground. The general indications are very satisfactory.

Botany.—The results are good. The year as a whole were a hard-working lot and often put in spare time on this subject on their holidays.

Minor subjects embrace physics, geology and mathematics. The latter is the greatest source of stumbling. On the whole the examination results on the subject are distinctly more promising than usual; though some four or five were poor, several showed more than usual promise. Geology and physics were satisfactory and the answers given intelligent.

Second year.

Total examined.	1st Class.	2nd Class.	3rd Class.	Failure.
13	3	6	2	2

This year is always a hard-worked one and in the year under report it was severely tested by the prominence of botany and chemistry as final examination subjects. On the whole, therefore, I consider that the year has shown up fairly well. Two of the men who failed were weak passes in their first year. One failed in two sections, chemistry and botany, and the other in three. The third failure, I think, is chiefly due to slackness. Two students are promising. Stated in detail the results in the different sections read as follows :—

	Examined.	1st Class.	2nd Class.	3rd Class.	Failure.
Agriculture ...	13	4	5	2	2
Chemistry ...	13	4	4	3	2
Botany ...	13	5	6	1	1
Minor subjects ...	13	3	6	1	3

Agriculture.—This was very fair. Only one man was outstandingly good and two or three were poor. I realized that serious competition for time allowed less devotion to the subject than in the past and in view of the large place it will occupy next year, my examination was not severe.

Chemistry.— The subject was taken by Mr. Harrison of Madras, as it was a final. He reports four men as first class, seven men as second and two failures and remarks that the standard and knowledge shown were satisfactory, his only point of criticism being the spelling of technical words.

Botany.—This subject was also examined by an external examiner, Mr. M'Crae of Madras. The results are good and reflect the general interest shown.

Minor subjects.— Animal physiology and anatomy, entomology, mathematics, mensuration and survey. The former two are really preparatory courses for the third year work. The mathematical and survey section is the most important. Except for four candidates, the general knowledge shown in the former is very fair. I am of the opinion that the chief defect in survey is lack of sufficient drilling to ensure rapid work. There is also a certain lack of knowledge of little details of field work which should be corrected :—

Third year.

Number examined.	1st Division.	2nd Division.	Failure.
13	3	9	1

The results shown are above the average of the last two years. Only one student failed badly. He did so principally in Botany and Chemistry.

The details in each section are as follows :—

	Examined.	1st Class.	2nd Division.		Failure.
			2nd Class.	3rd Class.	
Agriculture ...	13	4	8	1	...
Botany ...	13	4	8	4	1
Chemistry ...	13	4	8	...	1
Minor subjects ...	13	4	8	...	1

Agriculture.

The principal examiner was Mr. Knight of Poona. The principal of the college set one paper. The other paper and all the practical were in the internal examiner's hands. He reports that the knowledge of field crops, plant selection, implements and stock were considerably better than in past years, both in theory and practice. Though apparently more familiar with the handling of animals as a whole, a few showed lack of sufficient practice.

Chemistry.

The external examiner reported that the students showed a good general knowledge of the subject, the only point of adverse criticism being the incorrectness of the spelling of technical works.

Botany.

The subject was averagely well done; three men sent in good papers.

Minor subjects.

This consisted this year of four subjects—entomology, agricultural economics, veterinary and engineering. It is perhaps as well to tabulate these before noting on them:—

	Examined.	1st Class.	2nd Class.	3rd Class.	Failures.
Entomology ...	13	3	5	2	3
Agricultural Economics ...	13	1	6	3	3
Veterinary ...	13	9	2	1	1
Engineering ...	13	4	8	1	...

Entomology.

This was examined by Mr. Bainbrigge Fletcher, Pusa, who was this year able to attend in person, and thus to derive a better idea of the class of work and teaching. He reports that there was too much lack of knowledge shown in the recognition of common insects and of applied methods of prevention and cure—a lack of field experience. Three or four knew the subject fairly well and several were weak.

Agricultural Economics.

The paper was fairly well done. One student showed in a remarkably good paper. There was some weakness in farm accounts. This subject is taken by the principal and, on account of many calls on his time last year, did not receive quite the attention it has in the past.

Veterinary.

This was a rather easier paper than usual and scoring in this and the practical were high, thus tending to bring up the general percentage on the minor subjects and the examination as a whole above the average. The knowledge shown in the practical appears to have been a good deal better than in the past. Next year this subject will get more attention and be ranked as an examination pass section.

Engineering.

This paper was taken by three examiners, Mr. Pathak, First Agricultural Assistant, Mr. Cove (of the School of Handicrafts), Mr. A. Khande Rao (Public Works Department Overseer). The first two sections were on the whole reasonably well done. In the last the results were poor. This is probably due to the fact that the course connected with building was completed early in the year and did not get the attention of the examinees in preparation. This subject will also be of prime importance in the final of 1914-15:—

Prize Winners.

Third year.

Director's prize for the best student of the year ...	K. S. Pillai.
Chowdhari Agricultural Medal ...	L. V. Ghaté.
The Smythies Chemistry Medal ...	R. K. Prasad.
Special prize, botany	K. S. Pillai.
Special prize, minor subjects ...	S. H. Bennur.
The Kedarnath Rai Medal for agricultural machinery	not awarded.

Second year.

The Class prize ...	...	... V. S. Gokhale.
The Smythies Chemistry Medal	...	... V. S. Gokhale.
Special prize, botany ...	...	... Yar Mohammad.
Special prize, agriculture ...	...	... Sh. S. Hasan.
Special prize, minor subjects	...	... V. S. Gokhale.

First year.

Class prize ...	...	... P. G. Deshpande.
Chemistry special prize and Botany	...	... K. P. Verma.
Special prize, agriculture ...	...	... P. G. Deshpande.
Special prize, minor subjects	...	... K. P. Verma.

GENERAL COLLEGE PRIZES.

The Coronation Prize	...	K. S. Pillay.
The Napier Essay Prize	...	Chunnilal Gopal Das Shah.

THE HOSTEL.

The hostel has continued under the charge of Mr. K. P. Shrivastav, who has fulfilled requirements in an efficient and satisfactory manner.

Buildings, fittings. A few minor alterations were done. The chief needs are an improved sick room and a better water-supply, which will be undertaken in 1914-15.

Health. This has on the whole been quite satisfactory. A few minor ailments have been recorded; but in only two cases was leave necessary.

The College Agricultural Association. The society, which was instituted to encourage students to prepare, read and discuss agricultural subjects, has had a successful year. The larger number of papers were read by students. All showed considerable care and some were well written and delivered. I think there was a general improvement in style. I have decided to award the Napier Essay Prize to the best of these.

The college games. I cannot report a successful year. For a great portion of the session I was too busy to give the attention to games that they appear to chronically require to keep them alive. The new additions to the college in the incoming first year were for the most part an unathletic crowd and did not materially strengthen the college. The numbers of the college are not great and it is difficult with the small choice at its disposal, especially when a very fair percentage are not naturally apt, to compete with the larger educational centres. The results of the Inter-Collegiate Athletic Meeting and Hockey Shield were not such as to cause the college to boast. The college ground requires a good grant to enable it to be worth playing anything on. To some extent its condition militates against popularity.

The College day. This was held on the 22nd and 23rd December. This year the usual dramatic entertainment was given up. Till the college hall is fitted up properly, it will continue to be left out. The Museum stage is no longer serviceable. In the present year my absence at the Agricultural Conference for the larger part of December prevented rehearsals being possible, even if it had been. A number of old boys attended and an old Boys' Society was definitely formed. One of the chief values of the college day lies in the possibility of such a gathering. The principal items included were sports and a hockey match the first day, and a tennis match and the prize giving on the second.

Mr. R. C. H. M. King, Director of Agriculture, gave away the various work and athletic prizes and presented the degrees to such old boys of 1913 as were present.

R. G. ALLAN,

Principal, Agricultural College,

Nagpur.

APPENDIX I.

The results of the examinations.

Third year.

Name.	Total out of 950.	Place.	Class.	Remarks.
K. S. Pillai ...	623	1	1st ...	Director's prize, and special prize, botany.
L. V. Ghate ...	592	2	1st ...	Chowdhari Agricultural Medal.
R. K. Ramadin ...	584	3	1st ...	Smythies Chemical Medal.
S. D. Ebrahimji ...	571	4	2nd.	
N. N. Thampy ...	566	5	2nd.	
Kartar Singh ...	563	5	2nd.	
S. H. Bennur ...	551	7	2nd ...	Special prize, minor subjects.
Chunnilal G. Sha ...	530	8	2nd ...	
J. C. Roy ...	524	9	2nd ...	
G. B. Deshmukh ...	524	9	2nd ...	
A. H. Barde ...	516	10	2nd ...	
S. P. Thapak ...	503	12	2nd.	
G. M. Deshpande ...	476	13	Failure.	In chemistry and botany.

Second year.

Name.	Total out of 800.	Place.	Class.	Remarks.
V. S. Gokhale ...	517	1	1st ...	Class prize, Symthie Chemical Medal and minor subjects special.
S. S. Hasan ...	498	2	1st ...	Special prize agriculture.
Yar Mohammad ...	495	2	1st ...	Special prize, Botany.
T. B. Rairiker ...	478	4	2nd	
D. S. Bengali ...	460	5	2nd	
R. S. Pimpalkhare ...	455	6	2nd	
Abdul Aziz ...	453	6	2nd	
K. S. Pillay ...	447	8	2nd	
S. D. Deodar ...	407	9	2nd.	
V. D. Kalvit ...	393	10	2nd.	
S. N. Chowdhari ...	389	11	2nd.	
J. K. Chowdhari ...	352	12	Failure ...	Agriculture, chemistry, minor subjects.
V. N. Bhagwat ...	337	13	Failure ...	Botany and chemistry.

First year.

Name.	Total out of 800.	Place.	Class.	Remarks.
P. G. Deshpande ...	594	1	1st .	Class prize and special prize, agriculture.
K. P. Verma ...	581	2	1st ...	Special prize, chemistry, botany and special prize, minor subjects.
D. M. Bhave ...	491	3	2nd.	
D. B. Patwardhan ...	489	3	2nd.	
J. P. Kharey ...	483	5	2 nd.	
S. A. Inamdar ...	482	5	2nd.	
Anantlal Shrivastwa ...	481	5	2nd.	
M. N. Golwalkar ...	445	8	2nd.	
C. C. Sanyal ...	443	8	2nd.	
J. V. Goverdhan ...	419	10	2nd.	
G. Chalipatrao ...	413	11	2nd.	
D. V. Takle ...	389	12	Failure.	Chemisty and minor subjects.
C. S. Misra ...	363	13	Failure.	Do. do.
Gopal Prasad Agarwala ...	362	14	Failure.	Minor subjects.
K. S. Sen ...	288	15	Failure.	Agriculture, botany and minor subjects.

Financial statement of the Agricultural College, Nagpur, for the year 1913-14.

Serial No.	Heads of expenditure.	Amount. Rs.	a.	p.	Total. Rs.	a.	p.	Grand total. Rs.	a.	p.	Remarks.
1	Cost of college establishment	(*a*) 18,506	12	8	...	...	...	...	...	...	(*a*) (1) Salary of Principal, Agricultural College. Rs. 10,368 5 4
											(2) Salary of Masters ... 2,555 0 0
											(3) Do. Clerks ... 791 10 7
2	Cost of hostel establishment and contingencies ...	(*b*) 2,209	10	7	20,716	7	3	...	...	...	(4) Pay of Peons, etc. ... 346 2 0
											(5) Allowance to Lecturers ... 264 0 0
											(6) Local allowance etc., of Veterinary Assistant. 202 6 9
1	Purchase of furniture and apparatus	1,409	15	2	...	...	...	...	...	...	(7) Pay of Veterinary Assistant's peon. 51 7 9
											(8) Pay of Menagerie Keeper ... 240 0 0
											(9) Travelling allowance of Principal, Agricultural College, and establishment. 1,564 7 0
2	Petty construction and repairs	624	0	6	...	...	...	...	...	...	(10) Scholarships to Agricultural College students. 2,123 5 3
											Total ... 18,506 12 8
3	Games money	378	0	0	...	...	...	...	...	...	
4	Books for the hostel library	150	0	0	...	...	...	...	...	...	(*b*) (1) Allowance to Hostel Superintendent. 600 0 0
											(2) Pay of Hostel Chowkidar ... 192 0 0
											(3) Pay of Hostel servants paid from contingencies. 953 9 0
5	Other charges	9,991	9	7	12,553	9	3	33,270	0	6	(4) Contingent charges for the Hostel. 464 1 7
											Total ... 2,209 10 7

R. G. ALLAN,
Principal, Agricultural College,
Nagpur.

Statement showing the particulars of English classes for the year 1913-14.

Classes.	No. on the rolls.	Average daily attendance.	Average on the roll.	Classification according to creed and race.						Classification according to caste.			Districts from which recruited.						Age of pupils.			Parents' occupation.							Remarks.
				Muhammadans.	Hindus.			Others.	Total.	Brahmins.	Others.	Total.	Bengal and United Provinces.	Berar.	Central Provinces.	Native States.	Rest of India.	Total.	Maximum.	Minimum.	Average.	Government service.	Private service.	Profession.	Trade.	Agriculture.	Miscellaneous.	Total.	
					Bengali.	Marathas.	Northern Hindus.																						
3rd year...	15	14·6	14·5	1	3	5	2	4	15	6	9	15	2	1	7	3	2	15	25	21	23	5	1	1	1	6	1	15	
2nd year..	13	12·5	12·4	3	2	7	...	1	13	9	4	13	...	1	9	2	1	13	24	20	22	4	2	2	1	4	...	13	
1st year ..	15	15·0	13·5	...	2	7	5	1	15	9	6	15	...	1	11	2	1	15	21	17	19	6	1	1	...	7	...	15	

R. G. ALLAN,

Principal, Agricultural College,

Nagpur.

The Maharaj Bagh Menagerie.

During the past year the Menagerie was under the direct personal charge of Mr. Shukla till January 1914, when he proceeded on privilege leave and was replaced by Mr. Sayed Ramzan Ali in temporary charge.

The deer which escaped the rinderpest outbreak of last year are in good condition and mortality in all sections has been small.

The following improvements have been made :—

(1) The wall at the back of the small paddocks has been removed and replaced by Page's fencing, placed in the jungle at the back, thus allowing the animals more shade.

(2) A kheddah has been built inside the main paddock which permits of the easy coralling of the inmates, and several trees planted.

(3) The extensions have been made to two cages in the tiger-house.

(4) A grain godown has been built.

The much-needed alteration and extension of the monkey house will be taken up in 1914-15 and I hope to be able to so strengthen the water-gates of the main paddock as to prevent their damage during the monsoon and the subsequent escape of the deer. This year during the process of tree planting some of the animals took fright and effected an exit. They are on the farm and will be removed when food and water run short outside.

I have made considerable effort to re-establish the deer herd and to get other animals. A number of letters have been issued to Forest Officers and Feudatory Chiefs and in several cases a favourable reply has been received and I hope to strengthen the numbers shortly. The Rajah of Raigarh has kindly promised a tiger, as the present one in the Zoo shows signs of impaired vitality on account of old age. The Menagerie could do well with one or two more of these. Panthers are frequently offered, but we have more than we can do with as it is. Mr. Shukla has performed his work with keenness and interest.

R. G. ALLAN,

Principal, Agricultural College,

Nagpur.

Annual Report of the Nagpur College Farm, 1913-14.

General improvements on the farm.

Several minor additions and improvements to the farm property have been executed during the year under report.

The reconstruction of the old Veterinary Hospital building, almost a ruin, has provided an additional set of quarters for a Farm Overseer.

A brick silo has been built at the dairy. This is a cylindrical silo constructed five feet below ground-level and sixteen feet above, having a total capacity of about 2,100 cubic feet. It will come into use in the coming year and should prove invaluable in guaranteeing a steady supply of succulent material from the end of April to the middle of August.

The dairy young stock and calves have been housed in a new building chiefly constructed from spares found on the farm. The construction of this shed permits the one in the main yard to be utilized partly for dry stock and partly as a milking place during the monsoon when the usual plan is impossible. With the exception of a small sick shed for isolation cases, now in process of construction, these last two buildings complete the requirements of the dairy section, which may be regarded as typical of a modern model dairy farm.

2. In view of the fact that the steady increase of the Telinkheri Dairy scheme will in time reduce the grass available for the College Farm and on account of the greater demand for fodder at the present time at this farm, I have taken this year into the farm area two large fields, till recently rented to tenants, adjoining the dairy buildings. My action was to some extent influenced by the fact that the spread of *kans* and *dub* in these areas and inferior tillage was causing deterioration. This new area has been fenced by using material fulfilling no useful purpose in this respect on other parts of the farm. Steady progress has been made in clearing the land of *kans* and *dub*. Indeed with the successful ploughing done during the past six months the greater part of the farm has been practically cleared of these pests. The most serious cases of erosion are now under control.

3. A markedly successful piece of under-drainage was completed in June 1913. An area of low-lying land in an otherwise *kharif* field was under-drained by pipes, consisting of country wheel tiles. Cotton was sown on the area so treated, as on the rest of the field. In spite of the low-lying position which received most of the drainage of the area, the cotton continued to grow steadily during the heavy rains of July and early August, when the crop on the upper parts of the same field was at a standstill. The first picking on the drained area was some three weeks earlier than on the rest of the field. The shortage of September rain caused the drained area to dry out quicker than elsewhere on the field, though it gave three pickings in place of two. When it is taken into account that up to this year no *kharif* crop has ever succeeded in this area, the advantage of under-drainage in this particular case is evident. During the coming year the area under-drained will be extended. Under-drain pipes in the black cotton soil and under Indian climatic conditions should be bedded in a filling of gravel or coarse sand. In the case of sugarcane, irrigated garden crops grown on heavy soil and cotton in patches of low-lying character, the introduction of a simple under-drainage scheme would probably rapidly repay its initial cost.

4. Efforts have been made to improve the irrigation water-supply derived from Ambajheri seepage and utilized by the Kachi tenants. The area round the main springs, with the sanction of Municipality, has been fenced to prevent the damage annually done by grazing herds and the channel has been cleared, repaired and protected.

The irrigation pipe scheme on the farm was put in connection with the new Telinkheri pipe and has been in regular though limited use throughout the past few months. It has proved a useful protection to wheat and paddy and has permitted an extension of the clover crop.

I intend during the coming year to reconstruct the blacksmith and carpenters' shops, which have long stood in need of this and to make certain alteration in the old farm buildings, which I believe will make them more efficient.

The staff.

5. During the past year the farm has been under the charge of Mr. Jiyalal Tiwari. His work has been thoroughly efficient. I do not remember a year in which the preparation for the coming season has been as well advanced. Mr. Sule has acted as Overseer and has in particular controlled the sewage area. His work has met with my satisfaction. Both the above have, in addition to their actual farm work, to conduct student demonstration classes. Mr. Pendse and Gangakhedkar have been attached to the farm as assistants. The former has been responsible for the purity of cotton on the farm and on the holdings of tenants who have been encouraged to act as small seed farmers under the farm assistant's control. An increased quantity of pure Rosea seed is thus available. The work of both assistants has been satisfactory. Mr. Takle has continued as Dairy Overseer. The general cleanliness of this and the quality of the product turned out are sufficient evidence that he understands his work.

The season.

6. A reference to the rainfall statement will show that the quantity received has been below the average. The season has been one in favour of *kharif* rather than *rabi* crops. The heavy rainfalls of July and the shortage afterwards are the two chief features. Cotton, especially early sown cotton, did reasonably well; *sann*, the Sorghum and *juar* fodder crops were excellent on the whole. *Juar* grain was somewhat deficient, the usual outcome of a shortage in September. Linseed suffered most; except on the test plots the crop was practically a failure. Wheat was thin. The yield of the *rabi* fields was largely proportional to the care devoted to their tillage. The more productive lower areas on which special attention was concentrated when a shortage was feared returned yields quite up to the average. There is little doubt that, if monsoon tillage is careful and a good mulch produced at its close, successful crops are possible even in years of September shortage:—

Rainfall, 1913-14.

Month.	No. of rainy days.	Rainfall.	Average of the preceding 39 years.	Remarks.
1	2	3	4	5
		Inches.	Inches.	
June — 1st half	4	·63	2·55	
June — 2nd „	8	10·64	5·59	
July — 1st „	8	5·68	6·80	
July — 2nd „	10	5·04	7·06	
August — 1st „	5	6·01	7·38	
August — 2nd „	7	8·46	6·07	
September — 1st „	4	2·01	5·38	
September — 2nd „	...	...	4·53	
October — 1st „	3	·46	3·39	
October — 2nd „	...	...	·99	
November — 1st „	...	...	1·02	
November — 2nd „	1	·03	·46	

Month.	No. of rainy days.	Rainfall.	Average of the preceding 39 years.	Remarks.
1	2	3	4	5
		Inches.	Inches.	
December ... 1st half ...	2	·80	·68	
2nd ,, ...	...	...	·10	
January ... 1st ,, ...	...	...	·36	
2nd ,, ...	...	...	·25	
February ... 1st ,, ...	...	...	·18	
2nd ,, ...	1	·24	·24	
March ... 1st ,, ...	2	·90	·19	
2nd ,, ..	...	...	·18	
April ... 1st ,, ...	5	2·34	·18	
2nd ,, ...	1	·68	·29	
May ... 1st ,, ...	2	·35	·18	
2nd ,, ...	...	...	·27	

SERIES E.—SUBJECT.—Effect of tillage to various depths on wheat grown continuously.

Area of each plot is ·25 acre.

Plot 1—Scarified (*bakhared*) every year.

,, 2—Ploughed once with country plough and scarified.

,, 3—Ploughed with inversion plough and scarified.

Plots not manured and not irrigated in the year under report.

No. of plot.	Outturn per acre.										Cost of special treatment per acre over that bakhar.	Cost of cultivation per acre.	Value of produce per acre.
	Average 1901-02 to 1905-06.		1906-07 to 1910-11.		1911-12.		1912-13.		1913-14.				
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1 ...	573	707	533	778	596	704	429	488	609	554	...	9 4 0	35 15 10
2 ...	655	819	599	893	704	752	406	456	*696	665	2 13 0	12 1 0	41 7 3
3 ...	689	905	620	928	736	776	550	562	574	535	1 12 0	11 0 0	34 0 9

SERIES F.—Tillage experiments on *rabi* crops.
Area of each plot is ·15 acre.

Plot No. 1—Ordinary cultivation.
" 2—Frequent tillage.
" 3—Ordinary tillage with manure 4 tons per acre in wheat years.
" 4—First ploughing in May, 2nd in middle of August and frequent bakharings and finished with seed press and harrow after sowing.
Rotation.—Wheat two years and gram one.
Crop.—Wheat in year under report.

No. of plot.	Outturn of wheat per acre.				Outturn of gram per acre.		Outturn of wheat per acre.		Value of produce per acre.	Cost of cultivation per acre.	Profit per acre.
	Grain.	Straw.	Grain.	Straw.	Grain.	Chaff.	Grain.	Straw.			
	1910-11.		1911-12.		1912-13.		1913-14.				
1	2	3	4	5	6	7	8	9	10	11	12
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1 ...	727	800	907	1,000	936	1,156	544	471	51 14 6	6 5 1	25 9 5
2 ...	619	721	940	987	903	1,063	723	662	49 12 4	8 5 1	34 9 3
3 ...	706	731	1,073	1,200	966	1,200	727	750	43 13 7	16 5 1	27 8 6
4 ...	630	702	1,053	1,253	1,086	1,193	952	846	56 8 11	17 1 6	39 7 5

SERIES G.—SUBJECT.—*Rabi* crop rotations with wheat.
Area of each plot is ·17 acre.

Plot No. 1—Wheat every year.
" 2—Wheat and *lakh* alternately.
" 3—Wheat and gram.
" 4—Wheat and gram (mixed every year with the proportion of 6 to 1).
" 5—Wheat with subordinate rows of safflower every year.
" 6—Wheat and sesamum alternately.
Plot not manured in year under report.

No. of plot.	Name of crop.	Outturn per acre.								Value of produce per acre.
		Average of 5 years, 1902-03 to 1906-07.		Average 1907-08 to 1911-12.		1912-13.		1913-14.		
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7	8	9	10	11
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.
1	Wheat	794	1,119	701	795	268	315	566	522	33 8 4
2	Wheat	898	1,564	716	869	679	729	...	...	...
	Lakh	553	897	990	1,271	...	...	571	435	28 4 5
3	Wheat	934	1,639	632	774	715	685	...	...	...
	Gram	667	582	462	958	...	...	181	410	10 9 4
4	Wheat } mixed ...	676	1,191	524	640	470	444	665	688	40 0 0
	Gram }	162	344	160	210	368	497	28	72	2 1 1
5	Wheat	470	933	400	542	435	400	434	369	25 6 2
	Safflower	296	951	206	548	115	435	88	353	7 0 4
6	Wheat	715	890	767	902	606	611	.	..	...
	Sesamun	123	307	232	937	...	...	241	657	31 6 0

SERIES H.—The effect of interculture and spacing on *rabi* crop.

Area of each plot is ·29 acre.

Plot No. 1—Sown with ordinary *tifan* 12″ apart and 80 lbs. seed.
" 2—Sown with a tifan 18″ apart.
" 3—Like first plot, but half seed rate of the first.
" 4—Like second plot, but half seed rate of the second.
Crop.—Wheat in under report.

Rotation—Wheat two years at 80 lbs. per acre and gram one year at 25 lbs per acre.

Plot No.	Outturn of wheat per acre.				Outturn of gram per acre.		Outturn of wheat per acre.		Value of produce per acre.	Cost of interculture per acre.
	1910-11.		1911-12.		1912-13.		1913-14.			
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.		
1	2	3	4	5	6	7	8	9	10	11
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1 ...	659	778	848	855	852	959	616	814	38 15 1	...
2 ...	963	1,015	855	962	817	876	734	794	44 10 2	0 6 0
3 ...	890	955	903	1,066	490	593	724	744	43 10 2	...
4 ...	806	893	979	1,300	583	779	856	804	50 13 6	0 6 0

A year of low rainfall has again shown the value of a lower seed rate, while the wider sowing and a single subsequent inter cultivation has again proved the more effective method of cultivating wheat.

SERIES I-A.—*Kharif*.—Rotation experiment.

Area of each plot is ·10 acre.

No. of plot.	1st year.	2nd year.	3rd year.	4th year.
1	2	3	4	5
1	Cotton ...	*Juar* ...	*Tur* ...	Cotton.
2	" ...	*San* ...	*Juar* ...	*Juar* (fodder).
3	" ...	*Tur* ...	" ...	*Till*.
4	" ...	Pulse ...	Cotton ...	*Juar* and pulse (fodder).

No. of plot.	Outturn per acre.												Value of produce per acre.
	1910-11.			1911-12.			1912-13.			1913-14.			
	Crop.	Lint.	Seed.	Crop.	Grain.	Straw.	Crop.	Grain.	Straw.	Crop.	Seed.	Straw.	
	2	3	4	5	6	7	8	9	10	11	12	13	14
		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.
1	Cotton ...	70	131	*Juar* ...	1,165	6,012	*Tur* ...	672	1,845	Cotton ...	263	412	105 12 8
2	" ...	50	91	*San* ...	...	...	*Juar* ...	2,315	8,057	Fodder, *juar*.	...	5,020	83 10 8
3	" ...	90	174	*Tur* ...	1,254	4,100	" ...	2,035	6,850	*Till* ...	310	853	59 3 7
4	" ...	110	205	*Kulthi* ...	240	434	Cotton ...	410	807	Fodder ...	...	4,980	83 0 0

SERIES I-B.—Tillage experiments with rotation.

Area of each plot is ·10 acre.

	First year.	Second year.	
Plot No. 1—	Cotton and *juar*	,,	... Ordinary tillage and no manure.
,, 2—	,,	,,	... Frequent tillage and no manure.
,, 3—	,,	,,	... Ordinary tillage with four tons farm-yard manure.
,, 4—	,,	,,	... Ploughing first and then frequent cultivation.

No. of plot.	Outturn per acre.												Value of produce per acre.
	1910-11.			1911-12.			1912-13.			1913-14.			
	Crop.	Lint.	Seed.	Crop.	Grain.	*Karbi* (f dder).	Crop.	Lint.	Seed.	Crop.	Grain.	*Karbi* (fodder).	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.
5	Cotton. ...	80	174	*Juar* ...	925	5,142	Cotton. ...	210	437	*Juar*....	1,019	3,720	104 0 8
6	,,	80	173	,,	745	5,635	,,	190	583	,,	935	4,449	97 4 5
7	,,	60	100	,,	771	4,645	,,	280	560	,,	1,051	4,085	111 14 0
8	,,	140	250	,,	970	5,664	,,	210	405	,,	900	3,204	92 2 5

The heavy rainfall of July had a more serious effect on the ploughed land of plot 4 than on those in which the cultivation was shallower.

SERIES I-C.—Spacing experiment in a rotation of *kharif* crops.

Area of each plot is ·10 acre.

	First year.	Second year.	
Plot No. 1—	juar and Cotton	...	*Juar* sown with *tifan* in lines 12″ apart and distance between plant 6″. Cotton sown with *argara* in lines 18″ apart and distance betwen plots 8″.
,, 2—	,,	...	*Juar* sown with *argara* in lines 18″ apart and distance between plants 6″. Cotton sown with *argara* in lines 18″ apart and distance betwen plants 12″.
,, 3—	,,	...	*Juar* sown with *argara* in lines 18″ apart and distance between plants 12″. Cotton sown with *argara* in lines 18″ apart and distance between plants 16″.
,, 4—	,,	...	*Juar* sown with *argara* in lines 18″ apart and distance between plants 18″. Cotton sown with *argara* in line 18″ apart and distance between plants 20″.

No. of plot.	Outturn per acre.												Value of produce per acre.
	1910-11.			1911-12.			1912-13.			1913-14.			
	Crop.	Grain.	*Karbi* (fodder).	Crop.	Lint.	Seed.	Crop.	Juar.	*Karbi* (fodder).	Crop.	Lint.	Seed.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.
9 ...	*Juar* ...	495	6,832	Cotton.	204	396	*Juar* ...	1,342	4,430	Cotton.	226	354	92 14 6
10 ...	,, ...	962	5,032	,, ...	251	487	,, ...	1,115	4,170	,, ...	189	296	76 0 4
11 ...	,, ...	750	2,330	,, ...	212	412	,, ...	1,190	3,270	,, ...	192	300	77 3 0
12 ...	,, ...	610	2,095	,, ...	18	366	,, ...	1,029	2,876	,, ...	179	281	72 0 8

SERIES I-D.—To compare the effect of cultivation with foreign and Indian implements on *kharif* crops.

Rotation.—Cotton once and *juar* twice.

Juar manured in second year at 4 tons per acre.

Area of each plot is ·30 acre.

Plot I—Tillage with introduced implements.

,, II—Tillage with country implements.

Crop.—Cotton in year under report.

No. of plot.	Outturn per acre.												Value of produce per acre.
	1910-11.			1911-12.			1912-13.			1913-14.			
	Crop.	Lint.	Seed.	Crop.	Lint.	Seed.	Crop.	Lint.	Seed.	Crop.	Lint.	Seed.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.
13 ..	Cotton.	63	118	*Juar.*	575	2,937	*Juar.*	591	1,459	Cotton.	200	313	80 6 11
14 ...	,,	63	122	,,	517	2,875	,,	647	1,674	,,	216	339	86 14 10

This experiment appears to indicate that under local climatic conditions in the monsoon, the shallower type of cultivation effected by country tools is really more effective than deeper work, provided of course that the land is at the outset free of perennial weed.

SERIES L.—SUBJECT.—To test the value of artificial manures for cotton.

Area of each plot is ·10 acre.

Plot No. 1 — Calcium Nitrate=20 lbs. nitrogen.
Superphosphate=50 lbs.
Sulphate of potash=35 lbs.

,, 2 — Do. without sulphate of potash.

,, 3 — Do. do. superphosphate.

,, 4 — Do. do. superphosphate and sulphate of potash.

,, 5 — Do. do. calcium nitrate.

Plot 6 — Sulphate of ammonia only=20 lbs. nitrogen.
" 7 — Sulphate of potash only.
" 8 — Unmanured.

No. of plot.	Outturn per acre.								Value of produce per acre.	Cost of manure per acre.	Gross value deducting cost of manure.	Remarks.
	Average 1906-07 to 1910-11.		1911-12.		1912-13.		1913-14.					
	Lint.	Seed.	Lint.	Seed.	Lint.	Seed.	Lint.	Seed.				
1	2	3	4	5	6	7	8	9	10	11	12	13
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
1 ...	200	367	200	389	230	437	206	322	82 13 2	36 1 6	46 11 8	
2 ..	180	333	192	374	260	491	227	355	91 4 5	30 3 4	61 1 1	
3 ...	197	360	195	379	240	477	216	339	86 14 10	21 11 6	65 3 4	
4 ...	182	342	189	368	260	515	218	342	87 11 7	15 13 4	71 14 3	
5 ...	119	219	126	246	130	261	164	256	65 14 7	20 4 2	45 10 5	
6 ...	79	143	182	354	130	238	180	281	72 5 6	13 2 0	59 3 6	
7 ...	97	180	113	220	120	227	138	215	55 7 0	5 14 2	49 8 10	
8 ...	97	176	112	219	110	230	123	192	49 6 11	...	49 6 11	

SERIES M.—To determine the comparative value of cattle dung and urine as manures, the urine being conserved by the dry-earth system

Area of each plot is ·c8 acre.

Plot No. 1—Dung and urine of two bullocks for 30 days conserved by dry earth.
" 2—Dry excreta alone of two bullocks for 30 days.
" 3—Urine alone of two bullocks for 30 days conserved in dry earth.
" 4—No manure.
" 5—Same as plot 1.
" 6— Do. 2.
" 7— Do. 3.

Crop—Fodder (juar) followed by wheat.

No. of plot.	Outturn per acre.										
	Average 1906-07 to 1910-11.			1911-12.			1912-13.			1913-14.		
	Juar. (fodder).	Wheat grain.	Wheat straw.	Juar. (fodder).	Wheat grain.	Wheat straw.	Wheat grain.	Wheat straw.		Juar fodder.		
1	2	3	4	5	6	7	8	9	10	11	12	13
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		lbs.		
1 ...	4,358	447	565	8,462	362	462	981	1,018	...	12,475	..	...
2 ...	4,167	336	464	5,600	337	375	937	975	...	11,125	...	.
3 ...	4,623	359	485	7,150	200	250	843	981	...	12,750	...	...
4 ...	2,858	313	419	3,250	125	150	725	800	...	6,500	...	...
5 ...	4,454	462	572	6,162	337	462	1,031	1,231	...	13,750	...	...
6 ...	3,805	382	502	4 337	225	275	887	950	...	9,000	...	...
7 ...	2,794	384	482	5,825	175	287	818	825	...	10,750	..	...

The wheat crop failed during the year under report. After the removal of an exceptionally heavy fodder crop early in September, the absence of September rain rendered double-cropping almost impossible. The value of urine earth is clearly established.

SERIES N.—SUBJECT—To test the effects of different cultural treatments preparatory to sowing wheat.

Area of each plot is ·10 acre.

No. of plot.	Treatment.	Crop.	Outturn per acre.								Remarks, 1913-14.
			1909-10.		1910-11.		1911-12.		1912-13.		1913-14.		
			Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	Fallow	...	...	...	...	...	...	...	...	...	...	...	This year's outturn are not with publishing.
16	Fallow	...	...	...	...	...	...	...	...	...	...	...	
6	Ploughed in hot weather and *bakhared* in rains ...	Wheat	671	1,000	822	864	650	870	435	605	458	183	
7	*Bakhar* in rains ...	do.	800	1,210	705	874	640	832	400	55	50	215	
14	Not cultivated till after the rains are over ...	do.	650	950	360	360	290	320	155	175	...	...	
8	*San* ploughed in early	do.	650	1,140	915	1,602	660	830	385	427	...	...	
9	*San* ploughed in late	do.	631	850	666	700	400	575	390	380	...	...	
10	*San* ploughed in early with a dressing of two maunds of superphosphate at sowing.	do.	713	1,016	995	1,180	767	672	342	364	...	...	
11	*San* ploughed in late and treated with lime at ploughing ...	do.	530	1,020	606	662	355	485	360	318	...	...	
12	*San* ploughed in very late	do.	430	670	624	641	305	435	220	280	...	...	
13	Double-cropping	San	...	1,240	...	12,670	...	6,650	...	3,820	...	5,080	
	First crop legume for fodder ...	Wheat	560	1,020	612	647	637	736	585	785	38	173	
15	Double-cropping	Juar	...	2,070	...	1,330	...	2,460	...	220	...	4,020	
	First crop for fodder sorghum ...	Wheat	385	595	481	582	210	312	260	465	15	70	
17	Double-cropping	Mung	...	8 0	...	1,890	164	515	...	615	...	1,370	
	First crop legume for seed ...	Wheat	432	5[illegible]	657	695	370	560	345	415	3[illegible]	83	
18	*San* plough in alternate year with super ...	do.	...	...	...	...	...	...	290	30	103	193	
19	*San* ploughed in alternate year ...	do.	...	...	...	...	...	...	215	245	70	193	
20	*San* ploughed every third year ...	do.	...	...	...	...	...	...	209	266	40	180	

This series suffered severely from (*a*) the depredation of animals, the chief factor in evidence 6, 7, 8, 9 (*b*) the absence of latter rains. Double-cropping and even green manuring are doubtful practises locally.

Farm Crops.

Cotton.—The farms has been almost entirely sown with Rosea cotton this year. In addition to that grown on the farm area, several tenants have grown this variety from seed supplied by the farm. Their cotton has been rogued under the supervision of an assistant and has been ginned at the farm gin, and is practically as free from mixture as the farm crop. On the whole the outturn of cotton was as favourable as with the shortness in the September rainfall could be expected. Early sown cotton was quite satisfactory. The general treatment given was 3 tons cattle dung and 10 lbs. nitrogen as nitrate of calcium per acre.

Juar.—Chapti, Saoner and Ramkel were sown on the farm fields. The last named came to head fairly satisfactorily, but a very fair percentage of the two first failed to get free of the leaf sheath. The yield was less than a third of that recorded last year.

The same shortage of yield was noticeable in the variety test plots.

Trials were made on some 26 plots, each plot being sown with 5 lines 3 feet apart as last year, each line being the produce of the seed of a selected head of a good line last year. The best lines this year are almost invariably those related to the best lines of last year. As an appendix to the report I attach an examination conducted by Mr. Phatak on the food qualities of some of the varieties grown. Appendix III.

Fodders.—Sundia, Nilwa, Utvali and Lamkhansi were the chief fodders sown. As a whole they did well, except on one field, which was affected by the heavy rain of August. The heavy yields now required per acre in order to supply the increased fodder demands can only be got by heavy manuring. From a fodder point of view *juar* responds readily to treatment. A small application of soluble nitrate works wonders, if accompanying a dung dressing.

Tur.—*Tur* was a fair crop. I have come to the conclusion that it is not as valuable a crop in the farm cropping scheme as *san*. The money return per acre is less and the effect on the fertility smaller. In addition *san* leaves the land in a very clean condition and thus permits early sowing with impunity. Land after *tur* is almost invariably more weedy and cannot be safely sown before the next monsoon has broken. The area of *tur* will be reduced in future and its place as a maintainer of fertility taken by *san*.

San.—A good crop was taken.

Soybean.—Further extended trial in plots and lines was made this year. Except for a variety termed Java, a small black seeded type of late character, the yields were poor. Java, however, possesses an oil percentage but little better than the older acclimatized seed. I am unable to hold out any hope for the extension of Soy under local conditions of soil and climate. A few of the most hopeful types will be carried on in breeding lines.

Wheat.—Haura and Tigharia were sown on the farm this year. Following a catch crop the yields were negligible quantities. After green manuring they were fair. On fallow fields, well cultivated and mulched, the returns were quite satisfactory. There was a good deal of white ant damage in evidence. Wheat was grown under irrigation protection by the Economic Botanist. Several crosses show indications of being useful locally.

Linseed.—Except on the test plots, where very careful moisture conserving cultivation had been given, the crop was a failure.

In these the returns, though not as heavy as last year, were on the whole fairly regular.

Thirty-one red linseed types were tested. The average return was 320 lbs. per acre, though in several types the returns read at over 400 lbs. per acre, the highest being 490 lbs. or 53 per cent above the average of the series.

Twenty white linseed types were compared. In these the average per acre was 264 lbs. and the yield of the highest 326 lbs. or 24 per cent above the average.

Gram.—The returns considering the season were satisfactory.

Til.—The crop was a good one.

Ringni-juar.—This crop was valuable only as a source of fodder.

Oats.—Under irrigation oats were sown on a small area as fodder.

Bajra, Paddy and Chillies have only been grown on a plant breeding scale.

Implements.

8. The disc harrow introduced at the end of last season has proved of immense value throughout the cold and early hot weather. Employing the same labour and power as two *bakhars,* it does very much more efficient and deeper work. It is of considerable value as an implement to be used on land after the harvesting of a crop which it is intended shall be ploughed later. The difficulty of ploughing has been considerably reduced by its use and the rate at which the ploughing is done, increased. Though a very fair area of ploughing was taken in hand this year, and though there was no rain after the first week of September, all this work was completed by the first week of March.

Several new implements have been ordered for trial, but will probably not be in active use before the monsoon.

Dairy fittings will be mentioned under the dairy section of the report.

The Sewage Farm Section.

9. The lines, on which it was indicated that the work would be carried out, have been followed up. The value of the work has, however, been hampered by lack of quantity and of strength in the sewage effluent. It is expected that the pail depot now sanctioned will, however, put this right.

I am unable to report very definitely on the results to date. Cane, plantains, guinea grass, clover, lucerne, cabbage and knolkhol, oats have all done satisfactorily. The *juars* and Sorghums tried have not quite come up to my expectations. The undrained black soil does not appear capable of dealing with any quantity of effluent during the months of July and August. I have now a fair area under-drained by tiles and have arranged for the comparative growth and watering of several crops on the drained and undrained areas during the coming season. With the exception of *juar,* maize and Sorghums, most of the crops mentioned appear to be able to stand larger quantities between October and June than I was in a position to apply.

A pure water-pipe has been laid down in connection with the sewage scheme. Guinea grass is being grown on this area in comparison with the same crops under sewage effluent. The latter shows a distinct superiority.

As far as is possible, the work on the area is being done by bullock power. The disc plough, disc harrow, ridging plough and cultivating harrows and hoes all work efficiently and hasten the speed of preparation.

The Dairy Farm.

10. As noted under the headings of farm improvements, a silo and calf-shed have been constructed and an isolation shed for sickness is being built. The former is of brick lined with cement concrete and protected by a galvanized iron roof. The brick work is reinforced with iron rods let into the brick. The capacity is about 2,100 cubic feet. The calf-shed is divided into three compartments each with a small fenced paddock. The building is of iron, but heavily thatched.

The buildings.

The farm is now practically complete, though if funds permit I may next year roof over the milking flagged area to enable milking to be carried on at this place during the monsoon.

The dairy outfit.

During the year a complete sterilizing and pasteurizing and washing plant on a small scale has been installed. It consists of boiler, steam block, steriliz.r, paistesurizer and washing tubs, the water of which is heated by steam. A new 'two-minute' churn has been added to the stock. Aided by the centrifugal drier, the time required for butter preparation is considerably reduced and the quality and texture maintained. It has, however, to be tested against the 'end-over' churn during the hot weather, before it can be said to have proved itself.

Feeding.

This has followed the lines of the last report. It was found, however, that an addition to cotton cake and grain, a reduction of *til* cake was necessary to maintain the hardness of the butter during the hot weather, while the flow of milk was being maintained by silage. The dairy stock have been provided with succulent food throughout the year. Up to date the only period in which difficulty has been experienced is between the break of the monsoon and the middle of August, when grazing is worth considering.

The replacement of the pit silo, which had in the past to be emptied before the monsoon set in, by the pucca one mentioned will, however, allow of the difficulty being met. Briefly the succulent fodder demand is met by grazing in August and September, assisted by Sundia in the latter month; between this and the end of December by a succession of soiled Sorghum crops; between January and the end of April by clover, which is the salvation of the situation and thence forward to August by silage.

Clover is an excellent assistance to the maintenance of a full flow, but the percentage of fat falls while the animals are on this diet. The concentrates used have been *til* and cotton cake, cotton seed, *chuni* and *juar* meal and in some cases bran.

The young stock have been raised on a separated milk and linseed gruel feed after one month old and are thriving. Later on this was replaced by a mixture of bran, *chuni* and *til* cake. They were allowed free access to fine fodder and clover.

The practice of the dairy is essentially still feeding. Grazing except for a brief period in August and September, is practically only exercise.

The milk stock.

Two cows from which the returns were low have been sold off. One local buffalo has been purchased. The yields of the individual animals over the past lactation period and year will be found in the appendix. The improved feeding and care has caused a distinct increase in the returns from each animal. It will be noted that there is a very marked difference in yield and quality among the buffaloes in the herd. I had intended to make some further additions to both sections this year; but as the step was decided somewhat late I have on advice left this purchase to next year. Except for one buffalo, I have this year contented myself with the purchase of likely yearlings, two of which show remarkably good possibilities.

The young stock.

The yearlings and two-year-olds have maintained good condition. One likely young she-buffalo had, however, to be sold off as it suffered from inability to retain either its vagina or rectum.

The calves.

We have not had a successful year in regard to these, in particular the young buffaloes. Out of a total of nine buffalo calves, only three have been females. I attribute this to some extent to the fact that nearly all were covered late in heat.

There have been four losses, of which three were males. This perhaps may be due to an attempt to feed the latter on skim milk and substitute at too early a date. If maintained for a month on whole milk and if this is then replaced by separated milk and linseed gruel in sufficient quantity, the animals can be successfully reared. The young cow calves have done better.

The produce.

I append tables showing the sales from the dairy during the passed 12 months—April 1st, 1913 to March 30th, 1914.

Examination of these will show that the output of the dairy has increased considerably, though only one milking animal has been added. This is particularly so when it is realized that for several months last year a number of additional animals not actually of the herd were entertained and their produce included in the milk dealt with. 41,884½ lbs. of milk were produced this year. Of this 15,342 lbs. were sold as milk realizing Rs. 1,280, 1,821 lbs. were fed to young stock, and 24,654 lbs. were separated for other use.

From this 21,167 lbs. of skim milk were obtained, of which 14,616 lbs. were sold, realizing Rs. 487, and 4,147 lbs. were fed.

The usual balance was considerably reduced.

Of the milk separated approximately 240 lbs. were sold as cream, realizing Rs. 140 and 2,247 lbs. of butter manufactured, of which 1,978 lbs. were sold at Rs 1,731, and 258 lbs. converted to *ghi*, giving 191 lbs. of value Rs. 191.

The ratio of *ghi* to butter for the year was 74·8 per cent. This is lower than last year. The quality of both the milk and butter sold has been well maintained and the demand for the latter considerably exceeds the supply.

Appendices III and VI.—These give the individual returns of each buffalo and cow. As a result of one year's working two cows have been sold off. In the case of buffaloes the average milk over the lactation period was 3,552 lbs., varying from 5,280 lbs. to 1,981 lbs. in the case of a local animal. The average lactation period was 268 days, varying between 315 to 203 days, and the average return 13·3 per day ranging from 17·08 lbs. to 8·37 lbs.

	Average yield lactation.	Days in milk.	Daily average.
Delhis (3) ..	3,072	236	13 lbs.
Surtis (5) ...	4,183	310	13·5 lbs.

Examination will show that considerable differences exist in the fat percentage and the butter fat producing capacity of each animal. The value of the product of each individual as butter during the year varies from Rs. 315 to Rs. 162. The cows are even more variable.

In addition to the milk stock noted, the dairy herd has the following young stock :—

Buffaloes.	Cattle.
Between 2—3 years 2 (1 male).	Between 3—4 1 (male).
Between 1—2 years 6 (1 male).	Between 2—3 2 (1 male).
Between 3 m.—1 year 5 (2 males).	Between 1—2 7 (2 males).
	Between 3m.—1 year, 2 (1 male).

Appendices II and V give the values of the milk sold and otherwise disposed of month by month and the cost and returns of the herd during the past year.

The dairy was of much use in College teaching and was visited by a large number of people during the year. A certain amount of experimental work with regard to *ghi* is in progress.

Appendix I.

Month.	Whole milk.					Cream.				Skim milk.					Butter.				Ghee.	
	Quantity.	Sales.	Fed.	Experimental.	Separated.	Quantity	Sales.	Experimental.	For butter.	Quantity.	Sales.	Fed.	Experimental.	Unvalued.	Quantity.	Sales.	Experimental.	For Ghee.	Quantity.	Sales.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.
April ..	3,924 0	963 8	...	...	2,690 8	364 11	10 8	...	354 3	2,464 0	1,469 0	467 8	60 0	586 8	284 9	222 12	...	57 5	41 15	34 8
May ...	3,606 0	935 0	52 0	12 0	2,606 0	320 15	6 9	...	314 6	2,242 0	1,532 8	422 0	80 0	207 8	263 8	176 8	...	97 0	71 10	53 0
June ...	3,293 0	1,380 8	65 8	6 0	1,771 0	218 6	7 4	...	211 2	1,524 8	1,038 0	197 8	60 0	229 0	204 0	157 12	...	43 4	32 7	62 8
July ...	2,766 0	1,324 0	...	4 0	1,438 0	176 13	27 4	...	149 9	1,950 8	966 8	196 0	62 0	22 0	139 8	125 4	...	4 12	3 6	3 ½
August ...	2,819 0	1,311 0	107 0	4 0	1,397 0	171 15	18 13	...	153 2	1,221 0	985 0	179 0	57 0	...	131 10	122 12	0 8	7 14	6 5	6 5
September ...	2,256 8	1,178 8	80 0	5 0	1,033 0	126 10	14 14	...	111 12	894 0	580 8	249 0	60 0	5 0	101 0	103 0	...	4 4	3 4	3 0
October ...	3,111 8	1,138 0	230 0	4 8	1,739 0	213 9	10 4	...	203 5	1,513 8	1,164 8	201 8	38 8	107 0	137 15	140 15	...	3 12	2 15	2 15
November ...	3,404 0	1,297 8	402 0	5 0	1,699 8	208 12	12 12	0 8	195 8	1,469 0	1,098 0	264 8	61 8	44 0	150 3	137 4	0 3	...	...	...
December ..	3,913 0	1,402 8	251 0	2 8	2,257 0	280 14	20 14	0 2	259 14	1,964 0	1,402 0	352 0	35 8	174 8	197 8	178 8	...	9 8	7 6	6 12
January ..	4,273 8	1,436 0	212 0	4 0	2,621 8	330 14	38 8	...	292 6	2,279 0	1,756 8	355 0	59 8	108 0	202 8	210 12	...	15 12	12 4	12 4
February ...	4,324 0	1,388 8	137 0	7 0	2,772 0	349 2	40 12	...	308 6	2,404 0	1,588 0	536 0	67 0	213 0	219 0	200 0	...	15 0	9 12	4 0
March ...	4,224 0	1,587 0	264 8	14 8	2,358 0	402 4	32 6	1 14	368 0	1,942 0	1,036 0	737 0	78 0	101 0	215 12	203 4	...	...	...	5 6
Total ..	41,884 8	15,342 8	1,821 0	68 8	24,652 8	3,164 13	240 12	2 8	2,921 9	21,167 8	14,616 8	4,147	719 0	1,797 8	2,247 1	1,978 11	0 11	258 7	191 4	193 12
Value ...	Rs. 3,490 at. 12 lbs. per Re.	Rs. 1,280 at. 12 lbs. per Re.	...	...	...	..	Rs. 188 at 12 annas a lb.	...	...	Rs. 487 at 30 lbs. per Re.	...	...	...	...	Rs. 1,966 at. 14 as. lb.	Rs. 1,731 at. 14 as. lb.	...	...	Rs. 191 at Re. 1 per lb.	...

Appendix II.

Statement showing the money value of the sales of the Dairy products, used for calf feeding and experimental purposes.

Month.	Actual sales.	Calf feeding.	Experimental.	Unaccounted for.	Total.
1	2	3	4	5	6
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
April ...	364 6 9	15 9 3	2 0 0	18 15 0	400 15 0
May ...	324 15 9	18 7 9	3 10 9	6 14 9	354 1 0
June ...	347 12 3	12 0 6	2 8 0	7 10 3	369 15 0
July ...	275 4 9	8 8 6	2 6 3	0 12 0	286 15 6
August ...	269 2 0	14 14 3	2 10 6	...	286 10 9
September ...	221 10 3	14 15 6	2 6 9	0 2 3	239 2 9
October ...	267 6 6	25 14 3	1 10 6	3 9 0	298 8 3
November ...	274 5 3	42 5 0	3 0 0	1 7 6	321 1 9
December ...	312 13 6	32 10 9	1 7 9	5 13 0	352 13 0
January ...	346 5 9	29 8 0	2 5 3	3 15 0	382 2 0
February ...	326 0 0	30 15 0	2 13 0	7 1 6	366 13 6
March ...	343 15 3	46 3 9	5 5 3	3 5 9	398 14 0
Total ...	3,674 2 0 54 14 6	292 0 6	32 4 0	59 10 0	4,058 0 6 +54 14 6
	3,729 0 6				4,112 15 0

Appendix III.

Buffaloes.

Names.	Lbs. of milk in the whole lactation period.	Lbs. per day in the lactation period.	Lbs. of milk from April to March end.	Average per day in milk in the year.	Average fat p. c.	Lbs. of fat in milk 1=	Lbs. of butter produced= 1—16.	Value of butter at Rs. 0-14-0 per lb.	Lbs. of milk since introduced in the dairy.
1	2	3	4	5	6	7	8	9	10
								Rs. a. p.	
1. Ledi	4,460½	15·93	4,213½	11·54	7·37	310·5	360·3	315 10 6	8,824½
2. Genda	2,540	11·14	2,837	7·77	7·46	211·64	245·8	214 13 0	6,758½
3. Maina	2,264½	11·15	2,587½	7·09	7·3	188·85	219·0	191 10 0	5,724½
4. Gaora	5,280	17·08	4,098	11·23	7·58	310·62	360·4	315 3 6	6,646
5. Chandy	4,073	13·57	3,953½	10·8	7·68	303·59	352·0	308 0 0	6,192
6. Dundy	3,887	13·3	3,551½	10·8	7·29	258·8	300·0	262 8 0	5,742½
7. Bhury	4,112	13·08	1,901½	5·2	8·83	167·85	194·12	170 6 6	4,112
8. Chandry	3,263½	10·4	1,987	5·44	8·17	162·33	188·5	164 12 6	3,670½
9. Radha	1,981	8·35	2,420	6·6	7·42	159·72	185·4	162 1 6	3,657½
10. Gangoo	...	10·82	2,185	6·0	8·21	179·38	208·2	182 1 9	2,185

R. G. ALLAN,
Principal, Agricultural College,
Nagpur.

Appendix IV.

Cows.

		Lbs. of milk in the whole lactation.	Lbs. per day in the lactation period.	Lbs. of milk from April to 31st March.	Average per day in milk in the year.	Value at 6 seers per rupee.	Lbs. of milk since introduced.	Average per day.
1		2	3	4	5	6	7	8
						Rs. a. p.		
Hissar...	Harni ...	2,915½	6·38	1,803	4·94	105 4 0	4,610½	6·06
	Lanka ...	2,071½	7·67	2,071½	5·7	172 10 0	3,347½	4·44
Gaolas...	Tulja ...	2,794½	6·23	1,464½	4·01	122 0 9	2,401	4·09
	Karhi ...	2,262¾	5·71	1,821	4·98	151 12 0	2,262½	4·97
	Sakhor ...	1,103	6·64	1,103	3·02	91 14 9	1,130	3·53
	Jaini ...	1,115½	3·2	564	1·54	47 0 0	1,115½	Sold off.
	Kisai ...	850½	2·83	485½	1·30	40 8 0	850½	

Appendix V.

Balance sheet, Dairy Farm.

					Rs. a. p.
Expenditure.					
For food of whole herd including young stock	...	...	..		1,919 13 3
For labour	...	...	..		600 0 0
For purchased young stock ...	...	...	...		80 0 0
Miscellaneous recurring expenses ...	...	...	...		959 12 5
Depreciations and interest—					
On buildings at 5 per cent	...	...	...		258 12 0
On dairy outfit at 15 per cent	...	...	...		285 0 0
On purchased stock at 15 per cent	...	..	...		328 0 0
			Total	..	4,331 5 8
Returns.					
By the sales of the dairy products ...	...	...	...		3,729 0 6
Value used in the dairy ...	...	...	...		324 4 6
	Rs. a. p.				
For calf feeding ...	292 0 6				
For experiment ...	32 4 0				
Total ...	324 4 6				
By the sales of animals ...	...	...	..		205 0 0
Increased value of young stock ...	...	...	...		724 0 0
Value of manure ...	...	...	...		200 0 0
Skim milk unvalued ...	...	...	...		59 10 0
			Total	...	5,241 15 0

Rs. 5,241-15-0 – 4,331-5-8 = Rs. 910-9-4 net profit.

R. G. ALLAN,

Principal, Agricultural College,

Nagpur.

STATEMENT I.—Showing the total area and total yield of crops grown on the Nagpur Experimental Farm during the year ending the 30th June 1914.

Crop.	Area.	Total yield.	Remarks.
	Acres.	lbs.	
A.—Experimental Area.			
(1) *Kharif* crops—			
Cotton	1·90	967	
Juar	·40	396	
Soy bean	·20	44	
(2) *Rabi* crops—			
Wheat	3·23	1,670	
Gram	·17	97	
Til	·27	71	
Lakh	·17	97	
Wheat and gram mixed ...	·17	106 5	Wheat. Gram.
Wheat and safflower ...	·17	70 15	Wheat. Safflower.
Non-experimental Area.			
(1) *Kharif* crops—			
Cotton Rosea	18·53	7,649	
„ Buri	2·07	388	
„ Malvensis ...	1·00	180	
Juar for seed	15·00	4,934	
„ for fodder „ ...	45·60	135,000	Fodder (approximate).
„ varieties	3·00	991	
„ fodder for seed ...	4·50	1,130	Seed.
Tur	10·32	2,720	
Soy bean	2·50	608	
San	6·50	4,635	
(2) *Rabi* crops—			
Wheat Haura	17·25	...	
„ Tigharia ...	2·00	1,114	
Gram	22·38	5,110	
Linseed, ordinary ...	·50	189	
„ varieties... ...	1·25	387	
Til	5·00	572	
Peas { Ordinary... ...	2·75	340	
Peas { Khaperkhera ...	·50	130	
Oats	2·00	...	
Lakh	·50	30	
Fodder *juar*	4·00	2,000	
Third year students' plots area ...	6·60	...	
Seond „ „ „ ...	4·30	...	
Averseravation	2·00	...	
Botanical area	3·00	...	
Sewage area	3·00	...	
Miscellaneous crop ..	·50	...	

STATEMENT II.—Showing the account of receipts and expenditure under different heads for the year 1913-14.

Receipt.	Amount.	Expenditure.	Amount.
	Rs. a. p.		Rs. a. p.
Commercial sale of produce	4,445 2 2	Establishment's pay	4,764 0 0
Distribution of seeds	706 5 9	Travelling allowance	77 8 0
Distribution of implements	10 0 0	Total ...	4,841 8 0
Rent on Government land dry cultivation	563 8 0	*Supplies and Services.*	
Rent on Government land wet cultivation	644 0 0	Charges for seed grain	150 0 0
Dairy produce	4,298 5 6	Farm building	500 0 0
Miscellaneous	51 8 9	Construction and repair of road and Irrigation	1,400 0 0
Interdepartmental transfer	90 0 0	Purchase of cattle and implements	2,200 0 0
Grain fed to cattle	154 8 0	Feed and care of cattle	2,100 0 0
Fodders fed to cattle (estimate)	2,000 0 0	Servants paid from contingencies	5,640 0 0
Seeds sown on the farm	194 1 0	Manure	400 0 0
Seed distributed for experimental purposes free of cost	111 13 3	Dairy	1,430 0 0
		Contingencies.	
		Service postage and telegrams	35 0 0
		Stationery purchased locally	4 0 0
		Miscellaneous	1,000 12 3
			14,859 12 3
Total ...	13,269 4 5	Total ...	19,701 4 3

Report of the Economic Botanist, Central Provinces, for 1913-14.

Mr. Kalka Prasad, Assistant Economic Botanist, held charge of the work of this Section from August till November; for the rest of the year I held charge. Special attention was given to rice, juar, wheat and the genus *Capsicum*, while cotton, san hemp (Crotalaria juncea), bajra (Pennisetum typhoideum), it (Sesamum indicum) and a number of cucurbitas were grown under observation.

Rice.

A preliminary note on the classification of rices in the Central Provinces embodying the method of classification used was published during the year. Testing of selected lines of rice was continued on Telinkheri, Tharsa, Raipur and Adhartal Farms. Reports on these rices will presumably be found in the reports of the respective farms. The only report received was from Telinkheri, where 16 rices were tested. Unfortunately the plots were not uniform and too small to give reliable results. The results, however, tend to show that the method of comparing the weight of the grain from 200 heads does not give an indication of the heaviest yielding rice. Two distinct problems are involved in improving rice. For the ordinary cultivator yield is the important thing, but for better cultivators and those who have facilities for irrigation quality may make up from what is lost in quantity in the better rices. The ideal to be arrived at is one rice combining the two characters, but in the Central Provinces the preference for fine grained rices means a lower yield.

A detailed survey of the wild rices of the Central Provinces is of purely scientific interest.

Juar (Andropogon sorghum.)

The problem of natural crossing in this crop has been fully studied with regard to certain characters of the grain and glumes. The crosses have been found to behave according to the accepted Mendelian forms. A note is in course of preparation for the press.

Wheat.

The work continued on the same lines as last year. A number of hybrid Australian Indian wheats were received from New South Wales. Some of the hybrids were not fixed. The most promising plants have been selected.

Capsicum.

The demand for seed of the new varieties has increased greatly within the year. It was again difficult to meet the demand, but arrangements have now been made for growing the crop on a larger area.

The importance of the chillie may be gathered from the fact that ten lakhs worth of chillies are annually imported into the Central Provinces. The average agricultural labourer spends one rupee in ten of his income on chillies. The introduction of this early round chillie which can be grown without irrigation ought to mean a considerable saving in the weekly bazar bill.

The classification and description of the varieties grown in the Central Provinces has now been completed by the Assistant Botanist, Mr. Kalka Prasad, and the work will be ready shortly.

San Hemp (Crotalaria juncea).

Further progress has been made with the investigation of the varieties of this crop. The early sowing of the crop with irrigation has proved to be a great success in garden land. The crop sown in the middle of May can be turned in by the end of June. The green manure is thus well rotted by the monsoon rain and all danger to the subsequent crop from attacks of white ants is obviated.

Bajra, Pennisetum typhoideum.

Little further progress has been made with this crop. There was no demand for seed during the year, and as the problems involved in classification are mainly scientific, the work has been superseded by more urgent work of a practical bearing.

Cucurbitas.

The Jalgaon melon, a variety of Cucumis sativus still maintains its popularity. The Tapti Valley variety of Citru us vulgaris has also become increasingly popular. In one village the *Dhimars*, to whom this variety was originally given, refuse to part with the seed.

Herbarium.

The main additions during the year were collected in the Chhindwara Jagirs. Mr. A. E. Lowrie kindly allowed a plant collector to tour with him. The resulting collection proved to be most interesting,

Botanical Garden.

The land around the new laboratory is still buried under mounds of building material, and the stop-gap garden, now five years old, has had to render service for another year. Visitors seem content with the present garden, but it is difficult to keep the rapidly growing plants within bounds. The collection of the Central Provinces ferns was increased by the addition of an interesting climbing fern from Jubbulpore in the cold weather, while in May an extensive fern collection was made around Pachmarhi resulting in 37 ferns. The waste land lying to the south-west of the Victoria Technical Institute had at last been cleared, levelled and laid out as a small fruit experimental garden. Attention will mainly be given to oranges. Experiments dealing with manures, the influence of stock, optimum quantity of water, &c., will be laid down. The chief practical interest in these experiments lies in the large area of land available under Ramtek for citrus cultivation. The experiments will all be of practical value. In the manurial series attention will be mainly concentrated on locally available manures. Stocks will be tested and the best stock for each class of soil will be found out. Introduction of other kinds of citrus fruits will be carried through, because the Nagpur orange is at the best a fancy orange, unsuited to export.

Guayule (Parthenium argenteum.)

The plants flowered again during the hot weather and rains and the seed was infertile. In America propagation is carried out mainly by root suckers. So far none have appeared on the introduced plants. Possibly banking up the plants may tend to hasten their production. The plants are thoroughly established and the crop was not irrigated during the year.

Other work.

During the year seeds were sent to various private individuals and public institutions. Three large collections of seeds of economic plants were sent to the Soudan, Royal Botanical Garden, Edinburgh, and Glasgow Municipality. A collection of cuttings of 24 local plants were sent to the Botanical Department, St. Andrew's University. Of other seeds distributed the majority were selected rices, capsicum and varieties of cucurbitas.

In co-operation with the Economic Botanist to the Botanical Survey of India, large and interesting collections of edible tubers and edible fungi were made by the kind assistance of the Forest Department.

A scheme for providing Nagpur with a supply of fresh vegetables from Chhindwara throughout the year was drawn out, in consultation with Mr. A. E. Lowrie. The scheme resolved itself into a co-operative market garden, composed of local vegetable growers, centred round a small experimental market garden to be run by the Department. The local vegetable growers showed a remarkable keenness on the project, and should funds be available for the starting of the departmental garden, Nagpur, in the hot weather, will have a plentiful supply of English vegetables.

Mycology.

The most important work in this section is the breeding of rust-resistant wheats. A new disease of wheat identified by the Imperial Mycologist as "Take all" caused a good deal damage on low-lying fields at Tharsa.

Tours.

During the year all the Experimental Farms were visited; in addition visits were paid to Calcutta and Lyallpur. A short collecting trip was made to Pachmarhi in June. There were no changes in the staff during the year. Mr. Gregory, who has been granted an extension of service, worked as hard as the youngest member in the garden and fruit area. Mr. S. C. Roy is proving a worthy successor to Mr. P. A. Pandit in systematic work. Under Mr. Kalka Prasad he took charge of my experimental work during my absence with entirely satisfactory results.

R. J. D. GRAHAM,

Economic Botanist,

Central Provinces.

Report of the Central Museum, Nagpur, for the year 1913-14.

I.—Finance.

The opening balance at the credit of the Museum on 1st April 1913 was Rs. 954-8-6. The donation made by the Government for the year was Rs. 3,241, Rs. 1,000 being sanctioned as extra allotment in connection with the collection of articles and ornaments used by aboriginal tribes. The amount credited into the treasury from 1st April 1913 to 31st March 1914 came to Rs. 583-13-9 under all heads, making the total receipts Rs. 5,779-6-3. The expenditure incurred during the year under the head Contingencies amounted to Rs. 2,972-1-8 and the year closed with a balance of Rs. 2,807-4-7, *vide* details given in Appendix A. The actual expenditure incurred on payment of salaries and travelling allowance amounted to Rs. 3,716-6-5 and Rs. 306, respectively, against Rs. 3,608 and Rs. 350 provided for in the budget as detailed in Appendix B.

II.—Public Rooms.

The rooms were let 35 times during the course of the year for theatrical and other purposes as compared with 53 times during the previous year. The rooms were required twice a month for meetings of the District Council and Civil Station Sub-Committee. The University of Allahabad occupied the rooms free of charge for 15 days.

III.—Industrial Section.

A beginning has been made in gathering together the material necessary for starting the Ethnological collection. Rai Bahadur Hiralal was appointed collector in February in addition to his duties as Extra-Assistant Commissioner, Chhindwara. The systematic arrangement of the exhibits will not be undertaken till the new Museum building is built. In the new building the Industrial Section will be replaced by the Ethnological collection.

IV.—Archæological Section.

The descriptive catalogue of exhibits with its historical introduction which was prepared by Pandit Natesan Aiyar has been sent to the "Pioneer Press," Allahabad, by the Superintendent, Government Printing, Central Provinces, owing to the difficulty found in obtaining the special type required. The only addition to this section during the year was one inscription stone found by Rai Bahadur Hiralal in the Jubbulpore District. This has been described in the Indian Antiquary, Volume XVIII.

A seal of the First Babylonian Dynasty, which was exhibited in the Industrial Section, has been rediscovered by Munshi M. A. Suboor. It has been deciphered by Mr. L. W. King of the British Museum and dates about 2000 B. C.

A note on the same is likely to be published in some archæological paper.

Numismatics.—Cataloguing of the Muhammadan coins is being undertaken by Munshi Abdul Suboor.

Five hundred and thirty-two coins were presented to the Coin Cabinet during the year from various sources, details of which are given in Appendix C. Besides the coins for the Cabinet 219 which were withheld for sale, pending the determination of their value in the last year's report, have been taken on the list and 4 added during the year. Out of the list offered for sale 8 sold for Rs. 41-10-0.

The necessity for a larger safe for keeping coins is much felt. The present safe purchased in 1911 contains 1,800 coins. Muhammadan coins alone number 4,000. It is proposed to purchase a new safe capable of holding 6,000 coins. The present small safe will then contain the Hindu coins.

V.—Natural History Section.

Birds and Mammals.—During the year 113 birds and 9 small mammals were added to the collections. Of the birds 51 were collected in Bastar, 62 in Nagpur, and 1 sent in from Akola. Several of the Bastar birds are new to the collection and special mention may be made of two species, namely, the Yellow-breasted Babbler (*Mixornis rubricapillus*) and the Nilgiri Babbler (*Alcippe phæocephala*). The former has never been recorded before in the Central Provinces and the latter only at Pachmarhi.

The bird collection is now completely labelled and, as soon as the two new cases are available, its arrangement may be considered final.

The eggs of Franklin's Wren-Warbler were added to the egg collection: no mention is made of duplicates.

It is now considered proper in Museums to mount Zoological specimens, as far as possible, in their natural surroundings and this is being put into practice wherever possible. Four small groups of the Quails, the Doves, the Sandpipers and the Woodpeckers have been executed.

Reptiles.—The collection of local reptiles was properly arranged, classified and labelled, and additions made from time to time. A new method of setting the spirit specimens on porcelain slabs was adopted: this helps to show up the specimens to greater advantage.

Among the new snakes which have been collected, special mention may be made of Psammophis longifrons, Callophis trimaculatus and Typhlops acutus which have not previously been recorded in the Central Provinces.

Insects.—The local forms of the order Coleoptera were properly arranged for exhibition along with a few exotic species for comparison. Two Lucanid beetles are here pinned side by side displaying the terminology of the external integument.

Vivaria.—Two vivaria containing a Python and Russell's Earth Snake were displayed to the public and they proved an attractive feature.

A pigeon has been suitably mounted, displaying the topography of a bird.

Educational.

The poisonous and non-poisonous snakes are displayed side by side in two separate cases. A jar containing three snakes' heads has been set up to illustrate the terminology of the shields on the head.

Publications.—A Catalogue of the local Birds in the Museum was published and copies distributed to all Deputy Conservators of Forests and to other people who collect for the Museum. The following short notes were published in the "Journal of the Bombay Natural History Society":—

(1) The occurrence of the Snake (Psammophis longifrons) at Nagpur. (Vol. 22, No. 3.)

(2) The occurrence of the Slender Coral Snake (Callophis trimaculatus) at Nagpur, Central Provinces. (Vol. 22, No. 3.)

(3) The Yellow-breasted Babbler (Mixornis rubricapillus) in the Bastar State, Central Provinces. (Vol. 23, No. 1.)

(4) The Nilgiri Babbler (Alcippe phœocephala) in the Bastar State, Central Provinces. (Vol. 23, No. 1.)

Tours.—The greater part of January 1914 and half the month of February were spent in the Bastar State where 54 specimens were collected. From July 29th to August 5th the Assistant Curator was at Bombay to receive instructions from an expert Taxidermist from England.

Miscellaneous.—Thirty-two specimens, chiefly birds, were presented to the Raipur Museum: a small charge was, however, made for the wood work in these specimens. Large panes of glass have been inserted in certain show-cases in place of small panes, in order to improve the cases.

A small bookshelf containing books for ready reference is maintained in this section.

A need is felt for a few observation cages at the Museum. These are great aids to successful taxidermy, and as it is frequently our lot to secure specimens alive, these could first be observed prior to their setting up.

Visitors.—The total number of male visitors during the year was 106,381, the total number of female visitors was 43,108, making a grand total of 149,489. The average number per day was 410. The number is just the same as last year. It is very gratifying to note that the increased interest on the part of the public referred to last year has been continued. The new interest is centred in the Natural History Section. As pointed out under the report on that section, the educational side has been considerably developed during the year. This attracts mainly educated visitors, but the systematic arrangement unconsciously appeals to the uneducated as well, and by stimulating their interest will have a far reaching effect. Nothing is more obvious than the loss many inhabitants of this country suffer owing to their lack of power of observation.

VI.—ESTABLISHMENT.

There is no change in the establishment except a peon retired and one exchanged with the peon in Director of Agriculture's office.

The Museum is open daily from 7 A. M. to 6 P. M., except on Wednesdays from mid-day, when the Museum is reserved for female visitors. The average number of visitors availing themselves of the privilege was over 200.

Bell metal articles from Mandla have been received in April 1914. These are mainly useful articles and find a ready sale at the moderate prices asked.

There are many repairs required in the Museum Building at present. These have been held over pending the building of a new Museum.

R. J. D. GRAHAM,

Curator,

Central Museum, Nagpur.

Appendix A.

Contingent Expenditure incurred during the year ending 31st March 1914.

Details of heads.	Actuals.			Total.		
	Rs.	a.	p.	Rs.	a.	p.
RECEIPTS.						
Opening balance on 1st April 1913	954	8	6			
Allotment for 1913-14	3,241	0	0			
Extra allotment sanctioned in Secretariat letter No. 2532—II-7-21, dated the 1st December 1913.	1,000	0	0			
Amount credited into the Treasury	583	13	9	5,779	6	3
EXPENDITURE.						
Miscellaneous	1,261	13	6			
Servants paid from Contingencies	555	9	3			
Purchase and Repair of Furniture	874	2	9			
Postage and Telegram Charges	26	4	0			
Stationery	18	3	6			
Municipal Taxes	37	8	0			
Purchase of Books	90	1	0			
Hot Weather Charges	108	7	8	2,972	1	8
Closing Balance on 31st March 1914	...	...	...	2,807	4	7

R. J. D. GRAHAM,

Curator.

Appendix B.

Statement showing the Salaries of Establishment of the Central Museum, Nagpur, during the year ending 31st March 1914.

Name of Sub-head, &c., District.	Class of charges.	Details.	Budget allotment.	Actual.	Remarks.
			Rs. a. p.	Rs. a. p.	
26.—Scientific, &c., other Minor Departments, Nagpur.	Salary	Assistant Curator	2,040 0 0	2,057 2 2	
	Do.	Clerk	540 0 0	719 14 10	
	Do.	Custodian	216 0 0	216 0 0	
	Do.	Servants	732 0 0	723 5 5	
		Total ...	3,528 0 0	3,716 6 5	
	Allowances	Travelling Allowance	350 0 0	306 0 0	

R. J. D. GRAHAM,

Curator.

Appendix C.

Statement showing the number of Coins received in the Central Museum, Nagpur, during the year ending 31st March 1914.

Serial No.	Donor's name.	Number of specimens.					
		Gold.	Silver.	Copper.	Bullion.	Mixed.	Total.
1	Deputy Commissioner, Nimar ...	...	37	...	...	...	37
2	Director of Agriculture and Industries, Central Provinces ...	68	163	52	...	...	283
3	Honorary Secretary, Bombay Branch, Royal Asiatic Society, Bombay ...	4	19	...	...	5	28
4	Honorary Secretary, Coin Cabinet, Shillong ...	...	2	...	1	...	3
5	Under Secretary to Government, United Provinces, Allahabad ...	...	69	4	64	...	137
6	Deputy Commissioner, Chanda ...	...	44	...	...	...	44
	Total ...	72	334	56	65	5	532

R. J. D. GRAHAM,

Curator.

Report of the Agricultural Chemist, Central Provinces and Berar, for the year ending June 30th, 1914.

EDUCATION.

The change in the nature of the college course made during the past year increased the amount of time devoted to the instruction of students of the Agricultural College. Under the old scheme, third year students were taking Agricultural Chemistry, while under the new arrangement of college work the first and second years were devoting 50 per cent more time to Chemistry, in order that the whole of their course in that science should be completed within two years. It remains to be seen whether the concentration into two years of what is to most students a difficult subject will affect the degree to which it is assimilated and understood. It will probably be found that, although the same ground can be covered under the new system, the subject will have to be treated in less detail.

In spite of the disturbance caused by a rearrangement of time-table, the general results of the year's tuition were satisfactory.

Further details are given in the report made to the Principal, Agricultural College.

GENERAL ANALYSIS.

This work has continued as in previous years and consists largely in the examination of various food stuffs and manures used on the experimental farms. In the preceding year's report, reference was made to the investigation of a number of soils proposed for use in the construction of a bund on the Mahanadi irrigation scheme. In the year under review, a further enquiry was received from the Engineer in charge of this work, as to any action the selected soils would have upon steel work which might be used in the bund. The soils sent in for report were examined for substances which, in accordance with present day opinion, would hasten or retard the corrosion of iron or steel. The following samples were received for analysis :—

Soils	...	...	8
Manures	...	...	31
Food-stuffs	...	...	7
Miscellaneous	...	...	4
			50

INVESTIGATION.

The two main agricultural products which have received attention during the past year have been sugar and butter fat. Sugarcane analysis was carried out on Telinkheri, Sindewahi, Tharsa and Adhartal Farms and a large number of determinations were made.

At Telinkheri the area under each variety is not large, as this farm is used mainly as a trial ground. Twenty-six varieties were analysed as nearly as possible one year after they had been planted, and of these the West Indian canes showed considerable promise. B 1, 29 and B 147 have juices with 19·9 and 17·9 per cent cane sugar and a purity co-efficient of 92, while amongst other varieties Gilman's Red Sport, Bangla and Red Sport gave similar high results in their analyses. Java seed cane, although giving satisfactory figures, was not so good as West Indian cane.

In addition at Telinkheri the 2nd year and 3rd year crop of ratoon Khari cane was examined. Both crops gave the best results about fourteen months after ratooning, but the 2nd year ratoon crop gave a distinctly better juice than the 3rd year, reaching at its best to a sucrose percentage of 19·2 with a purity of 92·8.

At Sindewahi ten varieties were examined at intervals, to determine the progress of ripening of the cane.- The analyses will be found in the Appendix to the Sindewahi Farm Report. Kala, Red Mauritius and Pundia are varieties which never appear to give a juice of the purity attained by khari, Ashy Mauritius or Lanji, and it is worthy of note that, provided the cane receives careful attention, the juice remains relatively pure over a long period. From the figures referred to it will be seen that Pounda, Khari, Ashy Mauritius and Lanji promise to be the best early canes, while Sannabille and Red Mauritius come to maturity later. A number of other varieties growing at Sindewahi were all so analysed for purposes of comparison and record. The need for careful attention being given to prevent cane falling was shown by the analysis of a heavy crop of Red Mauritius cane. The lodged portion showed a purity of 79·8 and 2·03 per cent of invert sugar, while that which had been properly staked had a purity of 87·0 and only 1·17 per cent of invert sugar. An effort was made to examine the juice of a number of plots of Pondia cane sown at monthly intervals from October onwards, but after a few examinations the determinations were discontinued, as the crop was suffering badly from red-rot.

At Tharsa similar experiments were carried out as the soil is black *morand* and of a very different nature to the *wardi* of Sindewahi. Twelve varieties were examined at intervals of a fortnight, commencing from about 10 months after planting. Ashy Mauritius, Striped Mauritius, Lanji, and, canes have a relatively high purity early in the harvesting season. The green and striped Tana canes, although having a very attractive appearance, do not produce a very pure juice.

Another series of analyses carried out at Tharsa aimed at determining the ripening period of Sannabille cane, when planted at monthly intervals from October. The juice of the cane planted on the 20th October 1912 reached its maximum purity and cane sugar content towards the end of January 1914. That planted on the 20th November 1912 did the same about the middle of February 1914. No cane planted after December 1912 attained the richness in sugar and purity in juice of that planted before that date.

Other analyses dealt with the results of using heavy or dense light setts for planting. There was a slight increase in both purity and sucrose content, when heavy setts were used, this being also the experience at Sindewahi. Two varieties were also tested to determine, whether a poor juice is obtained, when the top of the cane is used for seed instead of the whole cane. With Ashy Mauritius a better juice came from the plants produced by whole cane setts but Sannabille gave the opposite results, the cane tops in this case yielding a juice of slightly higher value. This was also the result at Sindewahi with Ashy Mauritius, so there is no evidence that using cane tops for seed produces a poorer juice than whole cane.

At Adhartal Farm, Jubbulpore, cane analysis was carried out for the first time. A series of plots of Jubbulpore Pounda cane had been manured with various forms of nitrogenous manure. These were analysed after about 11 and 13 months of growth and on the second occasion the cane was distinctly riper than on the first. The cane manured with sulphate of ammonia gave a juice of the best quality, while the poudrette plot yielded juice with the least amount of cane sugar. Most of the plots produced a juice containing over 16 per cent cane sugar with a purity co-efficient of 90 or over.

A number of other varieties growing at Adhartal Farm were also examined. Some of these are little known and may prove valuable in certain areas, while others are not worth consideration.

A long series of analytical determinations have been started upon the chemical and physical characteristics of the fat of buffalo milk. This has been done in other countries for cows' milk and certain standards have been fixed. The object is to determine by what means it may be possible to identify buffalo milk as pure and what variations can be expected from its normal composition. As changes in climatic conditions and feeding have to be taken into

consideration, the determinations will have to be continued over a full year. They will then be extended to the milk from herds of buffaloes and cows. At present all information of this nature regarding the milk from Indian buffaloes or cows is very meagre and, from the standpoint of public health, it is very necessary that such knowledge should be extended.

Another investigation in progress is the determination of nitrogen distribution in the various kinds of paddy mostly used in the Central Provinces and Berar. This will be continued when our new laboratory accommodation allows of more delicate work than is possible at present.

A considerable time has been spent during the past year in arranging for the fitting up of the new laboratories now approaching completion. It is hoped that these buildings will be in full use during the course of the ensuing year.

Dated the 28th August 1914.

F. J. PLYMEN,

Agricultural Chemist,

Central Provinces and Berar.

MAP OF GOVT. EXPERIMENTAL FARM

Scale 16 Inches to one Mile.

To Napier

To Hastings Bay Gordon

To Wanganui

To Napier Road

Report on the Raipur Agricultural Station, 1913-14.

1. The Raipur Agricultural Station occupies an area of 224 acres, of which 60 are under grazing. It lies on a gentle slope, which includes typical samples of *matasi*, *dorsa* and *kanhar* soil. The *matasi* area is reserved solely for rice, the *dorsa* for rice followed by pulses or wheat, and the *kanhar* for wheat and sugarcane. Analyses of these three classes of soil are given below :—

	Matasi.	Dorsa.	Kanhar.
	Acres.	Acres.	Acres.
Insoluble silicate and sand	87·41	74·68	69·73
Ferric oxide	4·12	6·71	7·64
Alumina	4·78	11·43	13·83
Lime	0·28	0·85	1·05
Magnesia	0·30	0·81	0·75
Potash	0·43	0·86	0·79
Soda	0·13	0·20	0·25
Phosphoric acid	0·02	0·02	0 02
Sulphuric acid	Very little.	...	...
Carbonic acid	0·13	0·09	0·08
Organic matter and combined water	2·40	4·35	5·86
Total ...	100·00	100·00	100·00
Total nitrogen ...	0·053	0·041	0·036
Available phosphoric acid ...	·001	·001	·001
,, Potash ...	0·10	0·11	0·12

2. The farm occupies a central position in the most backward Division of the Provinces, which forms part of the rice tract. The main aim of the farm is the improvement of that crop by better cultivation, and seed selection. The most obvious improvement demanding the attention of the Department is that of introducing transplantation as a method of cultivating rice: by the method in vogue known locally as *biasi*, the seed is broadcasted in the rice plots, and the seedlings are thinned out when about a month or six weeks old by uprooting them with a plough, as a result of which most of them are killed, while those that survive this rough-and-ready thinning process are allowed to come to maturity. From a small beginning on a demonstration scale seven years ago, the Department has with the assistance of the District authorities increased the area of rice transplanted year by year. In the year under report the area transplanted had risen to 30,000 acres.

3. Plant-to-plant selection of Gurmatia, Parewa, Chinoor and early Nasik rice was continued: 3,396 lbs. of Gurmatia, 4,364 lbs. of Parewa and 388 lbs. of Chinoor paddy were distributed in the year under report. Rice-seed farms have been opened in Khandwa in Raipur district and in Amdi in Drug district, the owners of which were each supplied with 1,000 lbs. of selected Gurmatia seed. Our object will be to have a net work of such farms scattered over this Division, on which selected strains of the most productive varieties of rice under trial will be propagated for distribution to neighbouring villages. The whole area of each seed farmewill be transplanted. By insisting on this and on the seed being

supplied for some years at least from the Government farm, it will be possible to get rid of the mixture of wild rices which pollute the paddy of every village. It is not unusual to find an admixture of 50 per cent of these wild varieties in rice fields at present, all the grain of which drops before the crop is harvested.

4. A class for the training of men in practical work was as usual held on the farm during the rains. The members were trained more especially in the improved cultivation of rice, but a short time was also devoted to the cultivation of groundnut and sugarcane and to the working of farm machinery. At the end of their course, extending over a period of three months, they were given a written and oral examination of a simple nature to test the progress they had made. All but three of the 37 who completed the course succeeded in passing and were granted certificates. The quarters for the members of this annual class were extended by the addition of a building containing twenty rooms: a new farm office and quarters for a clerk were also constructed in the year under report.

5. The farm staff worked very well during the year. Rai Sahib Tundilal Powar, the Divisional Superintendent, displayed his usual zeal, tact and ability in the supervision of this farm and of all the demonstration work of the Division.

Rainfall for 1913-14.

Month.	No. of rainy days.	Rainfall.	Average of the preceding 9 years, *i. e.*, 1904-1905 to 1912-13.	Remarks.
		Inches.		
July ... 1st half ...	6	4·20	7·15	
July ... 2nd half ...	9	9·99	5·52	
August ... 1st half ...	8	8·72	9·93	
August ... 2nd half ...	8	3·40	5·24	
September ... 1st half ...	6	2·70	5·37	
September ... 2nd half ...	...	...	1·99	
October ... 1st half ...	3	1·38	1·03	
October ... 2nd half ...	...	...	0·62	
November ... 1st half ...	...	...	0·37	
November ... 2nd half ...	...	...	0·03	
December ... 1st half ...	2	0·79	...	
December ... 2nd half ...	...	...	0·64	
January ... 1st half ...	...	...	0·01	
January ... 2nd half ...	...	...	0·08	
February ... 1st half ...	...	...	1·11	
February ... 2nd half ...	1	0·40	0·30	
March ... 1st half ...	1	0·20	0·27	
March ... 2nd half ...	..	...	0·17	
April ... 1st half ...	6	1·93	0·45	
April ... 2nd half ...	1	0·22	1·22	
May ... 1st half ...	4	1·86	0·21	
May ... 2nd half ...	1	0·10	0·12	
June ... 1st half ...	2	0·83	2·13	
June ... 2nd half ...	7	1·51	4·05	
Total ...	...	38·23	48·01	

Character of the season.

Heavy showers amounting to 2·20″ fell on the 6th June and the sowing of *dhan* and other *kharif* crops was started. This was followed by a fortnight of comparatively dry weather, which interfered with the successful germination of the seed. Such *dhan* as had been sown before the rains (*khurra*) suffered much on this account.

The rainfall of the first half of July was also light, and the rice area to be transplanted had therefore to be irrigated from the farm tank at the time of transplanting.

The rainfall of August was up to the mark and enabled cultivators to finish both their *biasi* and transplantation.

The prospects in September looked gloomy. With a rainfall of only 2·70″ and a burning sun, rice made slow progress except where it was regularly irrigated. The farm crop grown under irrigation was excellent as usual, but in villages where the supply of water for irrigation ran short owing to the short rainfall and consequent failure of the tanks, the outturn fell to about 4 annas in light soil.

Owing to the early cessation of the monsoon, the sowing of *rabi* was started in the latter half of September which is about 6 weeks before the usual time for *rabi*. Gram did well, but the growth of linseed and wheat was affected by the hot sun and dry atmosphere.

Though the rainfall of October helped the *rabi* crops and late rice, the year as a whole was a bad one for the cultivators in this Division.

In the absence of a reliable water-supply, the farm is much handicapped, especially in the cultivation of *rabi* crops. The Serikedi tank constructed by Government supplies water for *kharif* irrigation only.

All the cane and fruit area on the farm had to be irrigated as usual by means of two centrifugal pumps driven by oil-engines.

Experiments.

SUBJECT.—To compare the outturn of broadcasted *biasi* with transplanted rice.

Irrigation to be given only if necessary to prevent withering.

CROP.—Parewa paddy—a medium variety.

Plot.	Outturn is given in lbs. per acre.						
	Average for 10 years including 1913-14.		For 1913-14.				
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Cost of cultivation and seed.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanted ..	1,387	1,150	1,290	1,080	39 6 0	10 10 0	28 12 0
Biasi ...	980	922	960	1,210	31 0 0	13 12 0	17 4 0

Transplantation has this year given an increase in yield amounting to 330 lbs. of paddy and a net profit of Rs. 11-8-0 per acre. The variety grown was Parewa, which matures in rather less than 5 months from the time of sowing the nursery. One irrigation was given to each plot in September to prevent the crop from withering. Owing to the early cessation of the monsoon and defective irrigation, the transplanted plot did not fare so well as it would have done in a year of good rains. The average increase due to transplantation over a period of 10 years is 407 lbs.

SUBJECT.—To compare the outturns of broadcasted (*biasi*) with transplanted rice. Irrigation to be given only if necessary to prevent withering.

CROP.—Gurmatia Paddy—A late variety.

Plot.	Outturn is given in lbs. per acre.						
	Average for 6 years 1908-09 to 1913-14.		For 1913-14.				
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Cost of cultivation and seed.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanted ...	1,393	1,357	1,360	1,410	44 12 0	10 10 0	34 2 0
Biasi ...	947	1,000	910	1,230	31 2 0	13 12 0	17 6 0

One irrigation had to be given to this series too in the year under report, to prevent the crop of both plots from withering. The increase due to transplantation amounted to 450 lbs. of paddy and the net profit to Rs. 16-12-0. The average increase over a period of 6 years has been 446 lbs.

SUBJECT.—To compare the outturn of irrigated broadcasted (*biasi*) with irrigated transplanted rice.

VARIETY.—Parewa—a medium paddy.

Plot.	Outturn is given in lbs. per acre.						
	Average for 10 years 1904-1913.		For 1913-14.				
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Cost of cultivation, seed and irrigation.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanted ...	1,679	1,455	1,700	1,720	53 2 0	13 6 0	39 12 0
Biasi ...	1,238	1,140	1,120	1,200	34 15 0	16 8 0	18 7 0

This series had the advantage of being regularly irrigated, and the increase due to transplanting has been higher in consequence, amounting in the year under report to 580 lbs. of paddy and the net profit to Rs. 21-5-0.

The average increase obtained from the transplanted plot in this series has been 441 lbs.

SUBJECT.—To compare the outturns of irrigated broadcasted (*biasi*) with irrigated transplanted rice.

VARIETY.—Gurmatia—a late paddy.

Plot.	Outturn is given in lbs. per acre.						
	Average for six years 1908 to 1913.		For 1913-14.				
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Cost of cultivation, irrigation and seed.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanted ...	1,807	1,217	1,940	1,840	63 2 0	13 6 0	49 12 0
Biasi ...	1,378	1,268	1,260	1,340	41 9 0	16 8 0	25 1 0

Here, too, regular irrigation was given and the transplanted plot showed up well. The increase obtained from plot No. I amounted in the year under report to 680 lbs. and the net profit to Rs. 24-11-0.

The average increase over a period of 6 years has been 429 lbs.

SUBJECT.—To compare the values of different manures for transplanted rice grown without irrigation :—

PLOT No. I ... Cattle-dung 20 lbs. nitrogen per acre.

" II ... Calcium cyanamide 20 lbs. nitrogen per acre as a top-dressing.

" III ... Bone-dust 20 lbs. nitrogen per acre.

" IV ... Bone-dust 10 lbs. nitrogen and saltpetre 10 lbs., nitrogen as a top-dressing.

" V ... Dried leaves of trees 20 lbs. per acre.

" VI ... Tank-silt 640 mds. per acre.

" VII ... Castor-cake 20 lbs. nitrogen per acre.

" VIII ... One year old poudrette 20 lbs. nitrogen per acre.

PLOT No. IX ... Night soil after Meagher system applied in the month of April every third year.

" X ... Bone-dust 10 lbs. nitrogen and sulphate of ammonia 10 lbs. nitrogen per acre as a top-dressing.

" XI ... Unmanured.

No. of plot.	Outturn is given in lbs. per acre.								
	Average for 10 years 1904 to 1913.		For 1913-14.					Profit or loss due to manure.	
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Value of increase.	Cost of manure.	Profit.	Loss.
1	2	3	4	5	6	7	8	9	10
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ..	1,317	1,175	1,580	1,620	49 7 0	28 3 0	2 8 0	25 11 0	...
II ...	1,017	993	1,400	1,270	43 2 0	21 14 0	14 6 0	7 8 0	...
III ..	1,749	1,621	1,680	2,360	55 3 0	33 15 0	20 6 0	13 9 0	...
IV ..	1,579	1,400	1,580	1,710	49 13 0	28 9 0	19 13 0	8 12 0	...
V ...	903	856	770	780	24 1 0	2 13 0	1 4 0	1 9 0	...
VI ..	1,194	1,113	1,310	1,440	41 6 0	20 2 0	2 8 0	17 10 0	...
VII ...	1,316	1,128	1,150	1,040	35 6 0	14 2 0	11 11 0	2 7 0	...
VIII ..	1,643	1,428	1,460	1,540	45 14 0	24 10 0	2 8 0	22 2 0	...
IX ...	2,100	2,300	1,600	2,080	51 15 0	30 11 0	3 2 0	27 9 0	...
X ...	1,184	1,047	1,620	1,550	50 4 0	29 0 0	16 5 0	12 11 0	...
XI ...	689	616	680	690	21 4 0	...	...	...	..

Before applying these manures in the year under report all the plots were cropped with *san* hemp which was ploughed in late as a green manure, the object being to raise the fertility of the unmanured plot without affecting the relative fertility of the different plots of the series. Night soil applied every third year, cattle-dung, poudrette, tank silt and bone-dust all gave considerable net profits. Green manuring with *san* proved very effective in increasing the outturn of the plots to which Calcium cyanamide is applied every year.

All the plots of this series had to be irrigated once to prevent the crop from becoming a failure.

SUBJECT.—To compare the valuesof different manures for *biasi* rice grown without irrigation :—

PLOT NO. I.—Cattle-dung 20 lbs. nitrogen per acre.
" II.—Calcium cyanamide 20 lbs. nitrogen per acre as a top-dressing.
" III.—Bone-dust 20 lbs. nitrogen per acre.
" IV.—Bone-dust 10 lbs. nitrogen and saltpetre 10 lbs. nitrogen as a top-dressing.
" V.—Dried leaves of trees 20 lbs. nitrogen per acre.
" VI.—Tank silt 640 mds. per acre.
" VII.—Castor cake 20 lbs. nitrogen per acre.
" VIII.—One year old poudrette 20 lbs. nitrogen per acre.
" IX.—Night-soil after Meagher system done in the month of April every third year.
" X.—Bone-dust 10 lbs. nitrogen and sulphate of ammonia 10 lbs. nitrogen per acre as a top-dressing.
" XI.—Unmanured.

No. of Plot.	Outturn is given in lbs. per acre.							
	Average for 10 years 1904 to 1913.		For 1913-14.					
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Increase due to manure.	Cost of manure.	Profit or loss due to manure.
								Profit. / Loss.
1	2	3	4	5	6	7	8	9 / 10
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p. / Rs. a. p.
I ...	1,135	1,075	1,080	1,050	33 9 0	17 7 0	2 8 0	14 15 0 / ...
II ...	898	951	790	770	24 9 0	8 7 0	14 6 0	... / 5 15 0
III ...	1,222	1,260	1,440	1,380	44 11 0	28 9 0	20 6 0	8 3 0 / ...
IV ...	933	854	1,370	1,670	43 15 0	27 13 0	19 13 0	8 0 0 / ...
V ...	625	602	700	850	22 8 0	6 6 0	1 4 0	5 2 0 / ...
VI ...	877	841	1,090	1,380	35 3 0	19 1 0	2 8 0	16 9 0 / ...
VII ...	914	984	1,010	1,020	31 9 0	15 7 0	11 11 0	3 12 0 / ...
VIII ...	997	943	1,240	1,430	39 7 0	23 5 0	2 8 0	20 13 0 / ..
IX ...	1,197	1,431	1,340	1,430	42 2 0	26 0 0	3 2 0	22 14 0 / ...
X ...	753	772	1,410	1,580	44 11 0	28 9 0	16 5 0	12 4 0 / ...
XI ...	480	338	510	550	16 2 0	...	...	... / ...

Night soil, poudrette, cattle-dung and tank silt all added considerably to the profit of cultivation in this series. Calcium cyanamide in the absence of *san* hemp was as usual applied at a loss. All the plots were irrigated once to prevent the failure of the crop.

SUBJECT.—To compare the values of different manures for irrigated *biasi* rice :—

PLOT NO. I.—Cattle-dung 20 lbs. nitrogen per acre.
" II.—Calcium cyanamide 20 lbs. nitrogen per acre as a top-dressing.
" III.—Bone-dust 20 lbs. nitrogen per acre.
" IV.—Bone-dust 10 lbs. nitrogen and saltpetre 10 lbs. nitrogen as a top-dressing.
" V.—Dried leaves of trees 20 lbs. nitrogen per acre.
" VI.—Tank silt 640 mds. per acre.
" VII.—Castor cake 20 lbs. nitrogen per acre.
" VIII.—One year old poudrette 20 lbs. nitrogen per acre.
" IX.—Night soil after Meagher system done in the month of April every third year.

PLOT NO. X.—Bone-dust 10 lbs. nitrogen and sulphate of ammonia 10 lbs. nitrogen per acre as a top-dressing.

" XI.—Unmanured.

No. of Plot.	Outturn is given in lbs. per acre.								
	Average for 6 years 1908 to 1913.		For 1913-14.						
	Grain.	Straw.	Grain.	Straw.	Value of outturn.	Value of increase.	Cost of manure.	Profit or loss due to manure. Profit.	Loss.
1	2	3	4	5	6	7	8	9	10
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	932	895	1,560	1,380	47 15 0	22 4 0	2 8 0	19 12 0	...
II ...	850	832	1,020	910	31 6 0	5 11 0	14 6 0	...	8 11 0
III ...	1,152	1,085	1,890	1,540	57 8 0	31 13 0	20 6 0	11 7 0	...
IV ...	1,002	1,089	1,380	1,210	42 6 0	16 11 0	19 13 0	...	3 2 0
V ...	712	736	850	800	26 5 0	0 10 0	1 4 0	...	0 10 0
VI ...	776	802	1,120	950	34 3 0	8 8 0	2 8 0	6 0 0	...
VII ...	855	875	680	710	21 5 0	4 6 0 loss.	11 11 0	...	16 1 0
VIII ...	1,068	935	1,260	940	37 15 0	12 4 0	2 8 0	9 12 0	...
IX ...	1,762	1,557	1,860	2,140	59 2 0	33 7 0	3 2 0	30 5 0	...
X ...	921	990	1,450	1,600	45 14 0	20 3 0	16 5 0	3 14 0	...
XI ...	747	649	810	910	25 11 0	...	...	...	...

Night-soil, cattle-dung and poudrette have in this as in the other manurial series accounted for large increases. Bone-meal supplemented with sulphate of ammonia in Plot X and by itself in Plot III gave a profit.

SUBJECT.—To ascertain the minimum quantity of water required to save a crop of medium, (i) transplanted and (ii) *biasi* rice in (*a*) *matasi* and (*b*) *dorsa* soil.

Plots to be manured annually with cattle-dung 20 lbs. nitrogen per acre.

VARIETY.—Parewa, a medium variety.

Plot.	Outturn is given in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			Dorsa soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Cft.	Inches.
Transplanted ...	1,090	880	33 2 0	1,010	780	30 9 0	10,890	33·01
Biasi ...	690	1,320	24 3 0	690	630	21 5 0	10,890	33·01

One irrigation of 3" of water or 10,890 cft. per acre was applied in September to save both plots. With scanty irrigation in this year of deficient rainfall

the transplanted crop gave an increase of 400 lbs. of paddy in *matasi* soil and 320 lbs. in *dorsa*.

The rainfall during the period of growth was only 33·01 inches.

SUBJECT.—To ascertain the quantity of water required to produce an average crop of medium (i) transplanted and (ii) *biasi* rice sown in (*a*) *matasi* and (*b*) *dorsa* soil.

Plots to be manured with cattle-dung 20 lbs. nitrogen per acre. Each plot to be ·10 acre.

VARIETY.—Parewa, a medium variety.

Plot.	Outturn is given in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			*Dorsa* soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Cft.	Inches.
Transplanted ...	1,250	1,150	38 8 0	1,130	970	34 10 0	25,410	33·01
Biasi ...	880	1,160	28 10 0	880	880	27 8 0	25,410	33·01

Three irrigations of 2″, 3″ and 2″ respectively were applied on the 21st August, 18th September and 1st October. The application of an additional 14,150 cft. of water to this series as compared with the last series increased the yield of transplanted rice by 160 lbs. and 120 lbs. of paddy per acre on *matasi* and *dorsa* soil respectively and increased the yield of *biasi* on the same soils by 150 lbs. of paddy per acre.

SUBJECT.—To ascertain the quantity of water required to produce a good crop of medium (i) transplanted and (ii) *biasi* rice sown in (*a*) *matasi* and (*b*) *dorsa* soil.

Plots to be manured annually with cattle-dung 20 lbs. Plot to be ·10 acre each.

VARIETY.—Parewa paddy, a medium variety.

Plot.	Outturn is given in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			*Dorsa* soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Cft.	Inches.
Transplanted ...	1,410	1,330	43 11 0	1,280	990	38 12 0	36,930	33·01
Biasi ...	990	1,440	32 12 0	930	940	29 1 0	36,930	33·01

Four irrigations of 3″, 2″, 3″ and 3″ were given on the 20th of August, 13th September, 20th September and 1st October. Compared with the last series, the additional watering given in this case increased the outturn of transplanted rice by 160 and 150 lbs. of paddy per acre and the outturn of *biasi* by 110 and 50 lbs. per acre on *matasi* and *dorsa* soil respectively.

SUBJECT—To ascertain the minimum quantity of water required to save a crop of late (i) transplanted and (ii) *biasi* rice in (*a*) *matasi* and (*b*) *dorsa* soil.

Plots to be manured annually with cattle-dung 20 lbs. nitrogen per acre Each plot to be ·10 acre.

VARIETY.—Gurmatia, a late variety.

Plot.	Outturn is given in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			*Dorsa* soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Cft.	Inches.
Transplanted ..	890	910	28 4 0	820	940	27 6 0	10,890	33·01
Biasi ...	700	770	23 3 0	800	990	27 0 0	10,890	33·01

In the year under report one irrigation of 3″ which corresponds to 10,890 cft. per acre, was sufficient to save the plots of transplanted and *biasi* rice in both classes of soil.

SUBJECT.—To ascertain the quantity of water required to produce an average crop of late (i) transplanted and (ii) *biasi* rice sown in (*a*) *matasi* and (*b*) *dorsa* soil. Plots to be manured with cattle-dung 20 lbs. nitrogen per acre. Each plot to be ·10 acre.

VARIETY.—Gurmatia.

Plot.	Outturn is given in lbs. per acre.						Quantity of water applied in cft.	Rainfall during the period of growth.
	Matasi soil.			*Dorsa* soil.				
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Cft.	Inches.
Transplanted ...	930	1,030	30 14 0	1,010	1,030	33 3 0	25,410	33·01
Biasi ...	750	760	24 10 0	990	1,040	32 10 0	25,410	33·01

Three irrigations of 2″, 3″ and 2″ were given the first on the 21st of August, the second on the 18th of September and the third on the 1st of October.

SUBJECT.—To ascertain the quantity of water required to produce a good crop of (i) transplanted and (ii) *biasi* late rice sown in (*a*) *matasi* and (*b*) *dorsa* soil. Plots to be manured annually with cattle-dung 20 lbs. nitrogen per acre. Each plot to be ·10 acre.

VARIETY.—Gurmatia.

Outturn is given in lbs. per acre.

Plot.	*Matasi* soil.			*Dorsa* soil.			Quantity of water applied in cft.	Rainfall during the period of growth.
	Grain.	Straw.	Value.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	Rs. a. p.	lbs.	lbs.	Rs. a. p.	Cft.	Inches.
Transplanted ..	1,030	1,150	34 4 0	1,040	1,050	34 1 0	36,930	33·01
Biasi ...	860	1,210	29 10 0	1,010	930	32 12 0	36,930	33·01

Four irrigations of 3″, 2″, 3″ and 3″ were applied on the 20th of August, 13th September, 20th September and 1st October respectively.

SUBJECT.—To ascertain the best spacing distance for transplanted seedlings. Plots to be manured with cattle-dung 20 lbs. nitrogen per acre. Each plot to be ·10 acre.

CROP.—Gurmatia.

Spacing.	Outturn is given in lbs. per acre.						
	Average for two years 1912 and 1913.		For 1913-14.				
	Grain.	Straw.	Grain.	Straw.	Value.	Cost of cultivation.	Profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Seedlings 4 inches apart ...	1,730	1,845	1,660	1,870	55 4 0	14 5 0	40 15 0
6 inches ,, ..	1,255	1,240	1,060	1,070	34 12 0	13 2 0	21 10 0
9 inches ,, ...	1,175	1,160	1,050	1,050	34 6 0	12 6 0	22 0 0
12 inches ,, ...	775	820	590	650	19 9 0	12 0 0	7 9 0
				Duplicate.			
4 inches apart ...	2,110	1,910	1,560	1,470	50 11 0	14 5 0	36 6 0
6 inches ,, ...	1,785	1,935	1,490	1,670	49 8 0	13 2 0	36 6 0
9 inches ,, ...	1,225	1,415	1,380	1,430	45 6 0	12 6 0	33 0 0
12 inches ,, ...	975	1,040	600	630	19 12 0	12 0 0	7 0 0

The 4″ spacing has again given the largest and most profitable outturn in both series. The plots were transplanted with single seedlings.

SUBJECT.—To ascertain the most economical seedling rate for transplanted paddy. Plots to be ·10 acre each :—

PLOT No. I.—Single seedling 6" apart.
" II.—Two seedlings per hole 6" apart.
" III.—Three seedlings per hole 6" apart.
" IV.—Bunches 6" apart.

No of Plot.	Outturn is given in lbs per acre.						
	Average for 2 years 1910-11 and 1912-13 excluding 1911-12.		For 1913-14.			Cost of cultivation, seed and irrigation.	Profit.
	Grain.	Straw.	Grain.	Straw.	Value.		
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I ...	2,685	2,825	1,600	1,670	52 11 0	12 14 0	39 13 0
II ...	2,405	2,145	1,660	1,740	54 11 0	13 3 0	41 8 0
III ...	2,395	2,940	1,930	2,060	63 11 0	13 8 0	50 3 0
IV ...	1,900	2,740	1,940	2,320	65 2 0	14 2 0	51 0 0

The outturns for the year under report contradict those of the previous year. The only explanation that can be offered is that the shortage of rain and bright sunshine of September were not conducive to the free tillering of the plots planted with the fewer seedlings.

SUBJECT.—To compare the values of *san hemp* and *sawri* (Sesbania aculeata) as green manures for transplanted rice.

CROP.—Gurmatia paddy.

Treatment.	Date of ploughing green manure.	Date of transplanting.	Outturn is given in lbs per acre.					
			Average for three years 1911-13.		Outturn for 1913-14.		Value.	Increase in value due to green manure.
			Grain.	Straw.	Grain.	Straw.		
1	2	3	4	5	6	7	8	9
			lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
San ...	15th July 1913.	16th July 1913.	746	730	810	790	26 7 0	5 13 0
Sawri ...	15th July 1913.	16th July 1913.	733	720	910	920	29 13 0	9 3 0
No manure ...	...	16th July 1913.	530	477	640	560	20 10 0	...
			Duplicate.					
San ...	25th July 1913.	26th July 1913.	890	703	700	810	23 6 0	8 0 0
Sawri ...	25th July 1913.	26th July 1913.	656	683	800	910	26 13 0	11 7 0
No manure ...	...	26th July 1913.	480	486	470	450	15 6 0	...

Sawri and *san hemp* ploughed in as green manures did fairly well in both series. In the first series the green manure was ploughed in when the crop was only one month old: in the duplicate the *san* and *sawri* were allowed nearly two weeks more and gave slightly increased yields in consequence.

SUBJECT.—To test the effect of different methods of tillage on *rabi* crops without manure. Plots to be ·20 acre each.

PLOT I.—*Bakhared.*

" II.—Ploughed with country plough.

" III.—Ploughed with Ransome's turn-wrest plough.

CROP.—Wheat and gram to be rotated.

No. of Plot.	Outturn is given in lbs. per acre.						
	Average for 9 years 1905 to 1913.		For 1913-14.				
	Grain.	Straw.	Grain.	Straw.	Value.	Cost of cultivation.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I Wheat ...	494	741	830	525	36 12 0	5 2 0	31 10 0
I Gram ...	711	667					
II Wheat ...	497	685	755	630	34 1 0	6 1 0	28 0 0
II Gram	732	740					
III Wheat ...	487	656	820	585	36 1 0	12 0 0	24 10 0
III Gram ...	773	709					

There would seem to be no great advantage gained by ploughing instead of *bakharing kanhar* soil for gram: moreover the cost of ploughing with the turn-wrest plough is more than twice that of bakharing. All three plots were cultivated in September after the cessation of the rains.

SUBJECT.—To test the effect of different methods of tillage on *rabi* crops manured with cattle-dung (20 lbs. nitrogen per acre) applied every second year. Plots to be ·20 acre each:

PLOT I.—*Bakhared.*

" II.—Ploughed with country plough.

" III.—Ploughed with Ransome's turn-wrest plough.

CROP.—Wheat and gram to be rotated.

No. of plot.	Outturn is given in lbs. per acre.						
	Average for 9 years 1905 to 1913.		For 1913-14.				
	Grain.	Straw.	Grain.	Straw.	Value.	Cost of cultivation.	Net profit.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
I Wheat...	454	680	725	590	32 10 0	6 6 0	26 4 0
I Gram ...	725	698					
II Wheat	442	674	745	515	33 3 0	7 5 0	25 14 0
II Gram ...	737	735					
III Wheat...	486	647	820	555	36 8 0	13 4 0	23 4 0
III Gram ...	805	676					

SUBJECT.—To test the effect of *san hemp* as green manure ploughed in at different times for irrigated wheat. Plots to be ·25 acre each.

PLOT I.—*San* hemp ploughed in as green manure in middle of August.
" II.—*San* hemp ploughed in as green manure at the end of August.
" III.—Unmanured.

No. of Plot.	Outturn is given in lbs. per acre.						
	Average for 2 years 1912 and 1913.		For 1913-14.			Increase or decrease in value due to green manure.	
	Grain.	Straw.	Grain.	Straw.	Value.	Increase.	Decrease.
1	2	3	4	5	6	7	8
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs a. p.	Rs. a. p.
I ...	795	840	620	760	34 3 0	...	0 15 0
II ..	695	755	540	670	29 13 0	...	5 5 0
III ..	700	845	630	870	35 2 0	...	...
				Duplicate			
I ...	700	830	610	820	33 15 0	...	7 12 0
II ..	690	805	610	840	34 0 0	...	7 11 0
III ..	755	865	750	1,010	41 11 0	...	...

Manuring with *san hemp* has reduced the outturn in both series but to the greater extent in the duplicate series in which it was ploughed in a fortnight later than in the 1st series. The detrimental effect which the green manure has on the outturn in a case of this kind is most probably due to the extent to which the stems of the ploughed-in crop keep the soil loose and open, in which state it suffers more from drought in a year like that under report than the unmanured soil. Had it been possible to irrigate the plots after the ploughing-in of the green manure as has been done in previous years, the evil effect of the *san* would have been reduced; but owing to shortage of water this could not be done in the year under report. The wheat was irrigated once during its period of growth.

SUBJECT.—To ascertain the outturn of different varieties of groundnut followed by wheat grown as a second crop under irrigation. Plots to be ·10 acre each and to be manured with poudrette (40 lbs. nitrogen per acre annually):—

No. of Plot.	Outturn is given in lbs. per acre.					
	Average for 5 years 1909 to 1913.		For 1913-14.			Value of both crops.
	Grain.	Straw.	Grain.	Straw.	Value of Outturn.	
1	2	3	4	5	6	7
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
I Virginia ...	888	...	910	...	91 0 0	128 5 0
I Wheat ...	720	886	680	790	37 5 0	
II Big Japanese ...	862	...	970	...	97 0 0	136 12 0
II Wheat ...	662	916	730	780	39 12 0	
III Pondicherry ...	996	..	1,140	...	114 0 0	147 13 0
III Wheat ...	478	606	610	800	33 13 0	
IV Madras ...	1,064	...	660	...	66 0 0	106 0 0
IV Wheat ...	570	724	730	840	40 0 0	
V Mozambique ...	884	...	920	...	92 0 0	135 11 0
V Wheat ...	774	900	800	890	43 11 0	
VI Local ...	1,324	...	1,040	...	104 0 0	138 0 0
VI Wheat ...	674	778	640	480	34 0 0	

The highest average outturn of groundnut over a period of five years has been obtained from the plot sown with the local variety; but Pondicherry stands first in the year under review. Wheat was grown as the second crop and yielded well in all six plots. The wheat was irrigated three times.

SUBJECT.—To ascertain the relative value of outturns of different varieties of irrigated wheats grown on unmanured land :—

Serial No.	Name of variety.	Outturn is given in lbs. per acre.				Valuation by Ralli Brothers per cwt.	Value of each variety per acre.
		Average for 2 years 1912 and 1913.		For 1913-14			
		Grain.	Straw.	Grain.	Straw.		
1	2	3	4	5	6	7	8
		lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	Nagpur Hawra ...	510	460	500	420	5 10 0	25 2 0
2	Pusa No. 4 ...	655	570	570	520	5 12 0	29 4 0
3	Pusa No. 6-A. ...	555	400	450	400	5 11 6	23 0 0
4	Pusa No. 7 ...	790	785	660	610	5 13 0	34 4 0
5	Poona-Nagpur-Muzzaffarnagar.	670	645	660	590	5 11 0	33 8 0
6	Poona Hansia of Broach ...	700	715	840	790	5 5 0	39 14 0
7	Pusa No. 8 ...	725	635	890	750	5 12 0	45 11 0
8	Raipur Red Pissi ...	770	780	740	780	5 8 0	38 5 0
9	Hoshangabad White Pissi ...	775	815	870	890	5 14 0	45 10 0
10	Hoshangabad Mundi Pissi ...	760	910	780	1,040	5 13 0	40 8 0
11	Raipur Kathia ...	950	860	1,010	1,120	5 0 0	44 10 0
12	Pusa No 108 ...	680	710	640	680	5 13 0	33 3 0
13	Pusa No. 107 ...	635	790	430	580	5 13 0	25 7 0
14	Pusa No. 12 ...	610	565	580	510	5 10 0	29 2 0

Owing to shortage of water, one light irrigation only could be given. Raipur Kathia, Pusa No. 8 and Hoshangabad white Pissi gave the largest yields and Pusa No. 8 and white Pissi the largest profit per acre.

SUBJECT.—To ascertain the relative values of different varieties of irrigated wheats grown on manured land. Sixteen cart-loads of poudrette manure per acre to be applied annually :—

Serial No.	Name of variety.	Outturn is given in lbs. per acre.				Valuation by Ralli Brothers per cwt.	Value of each variety per acre.
		Average for 2 years 1912 and 1913.		For 1913-14.			
		Grain.	Straw.	Grain.	Straw.		
1	2	3	4	5	6	7	8
		lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	Nagpur Hawra ...	955	970	1,010	680	5 10 7	50 12 0
2	Pusa No. 4 ...	820	745	980	830	5 12 0	50 5 0
3	Pusa No. 6-A ...	615	750	770	760	5 11 6	39 5 0
4	Pusa No. 7 ...	1,255	1,440	1,270	1,500	5 13 0	65 15 0
5	Poona-Nagpur-Muzzaffarnagar.	1,015	1,170	1,250	1,500	5 11 0	63 8 0
6	Poona Hansia of Broach ...	930	1,020	960	1,080	5 5 0	45 9 0
7	Pusa No. 8 ...	630	735	600	850	5 12 0	32 13 0
8	Raipur Red Pissi ...	960	995	980	910	5 8 0	48 2 0
9	Hoshangabad White Pissi ...	960	1,165	880	1,030	5 14 0	46 3 0
10	Hoshangabad Mundi Pissi ...	980	1,070	920	840	5 13 0	47 12 0
11	Raipur Kathia ...	870	1,040	800	980	5 0 0	35 11 0
12	Pusa No. 108 ...	830	960	800	1,080	5 13 0	41 8 0
13	Pusa No. 107 ...	885	1,160	850	1,120	5 13 0	44 2 0
14	Pusa No. 12 ...	765	930	930	1,060	5 10 0	49 11 0

To this series, too, only one light irrigation could be given. Pusa No. 7 gave the highest outturn.

SUBJECT.—To ascertain the relativs outturns of different varieties of rice :—

Name of variety.	Outturn is given in lbs. per acre.				Remarks.
	Average outturn.		For 1913-14.		
	Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6
	lbs.	lbs.	lbs.	lbs.	
Chinoor	1,197	1,370	1,540	1,980	
Gurmatia	1,260	1,247	1,300	1,340	
Berbice	1,233	1,640	1,680	2,720	
Ruibutta	790	960	1,120	1,560	
Kubrimohar	813	1,167	1,300	2,200	
Chinisakar	893	1,093	1,200	1,820	
Motisar	743	960	940	1,440	
Bishanbhog	763	937	960	1,320	
Kanakjir	817	993	1,040	1,380	
Laxmibhog	943	1,263	1,240	2,040	
Hansa	1,253	1,283	1,340	1,520	
Banko	1,110	1,260	1,600	2,040	
Chilakat	950	1,027	960	1,320	
Berbice Creole	907	1,060	1,120	1,580	
Bhondu	1,007	1,103	1,360	1,700	
Eklombi	1,163	1,187	1,560	1,680	
Haladgundi	1,107	1,197	1,400	1,700	
Sarmod Red	713	810	1,140	1,360	
Parewa	1,033	1,127	1,280	1,440	
Sarmod White	867	973	1,100	1,360	
Katasila	1,057	1,037	1,620	1,460	
Khutboera	857	967	1,120	1,360	
Safeda	773	1,030	1,060	1,800	
Raskadam	547	737	640	1,020	
Nasik Early	647	793	820	1,060	
Kabri	760	910	940	1,000	
Rajbalam	720	863	800	1,100	
AVERAGE FOR TWO YEARS.					
Baudkhani	790	1,090	880	1,400	
Badshabhog	650	1,080	740	1,560	
Bank Tulsi	610	790	740	980	
Samundraballi	620	840	820	1,220	
71 Bahuja chinga	640	820	1,060	1,340	
72 Makunja	590	710	780	1,020	
73 Kishanbhog	620	1,090	1,000	1,860	
74 Tulsi manjura	540	800	880	1,360	
75 Padamful	570	670	840	1,020	

Statement showing the seeds supplied to Government Officers, private persons, Demonstration Farms and members of the District Agricultural Association :—

Serial No.	Names of seed.	Government officers.	Other private persons.	Demonstration Farms and members of the Agricultural Association.	Total.
1	2	3	4	5	6
		lbs.	lbs.	lbs.	lbs.
1	Chinoor Paddy ...	...	296	92	388
2	Gurmatia ,, ...	...	2,380	1,016	3,396
3	Parewa ,, ...	...	4,272	92	4,364
4	Chilakot ,, ...	...	132	...	132
5	Motisar ,, ...	...	...	20	20
6	Early Nasik ,, ...	...	...	40	40
7	Raskadam ,, ...	125	28	...	153
8	Berbice ,, ...	...	...	20	20
9	Berbice creole ,, ...	...	...	20	20
10	Khutboera ,, ...	...	33	...	33
11	Rajbalam ,, ...	...	28	38	66
12	Dandkhani ,, ...	...	...	24	24
13	Baosabhog ,, ...	...	...	20	20
14	Kishanbhog ,, ...	...	56	20	76
15	Tulsimanjura ,, ...	...	...	20	20
16	Padamful ,, ...	...	...	20	20
17	Pusa No. 4 Wheat ...	...	230	...	230
18	Pusa No. 108 ,, ...	...	262	...	262
19	Pusa No. 7 ,, ...	20	194	...	214
20	Pusa No. 12 ,, ...	82	105	...	187
21	Pusa No. 107 ,, ...	...	20	...	20
22	Raipur Kathia ,, ...	40	...	...	40
23	*Tur*	...	561	...	561
24	*Juar*	...	230	613	843
25	Local groundnut	82	628	398	1,108
			Canes.		Canes
26	Gibman's Redspot cane ...	...	225	...	225
27	Pundia cane	...	10	...	10
28	Ashy Mauritius cane ..	...	660	...	660
29	Stripped Mauritius	...	40	...	40
30	Red Mauritius	...	65	...	65
31	Sannabille	...	500	...	500
			lbs.		lbs.
32	Clover seed	...	10	...	10

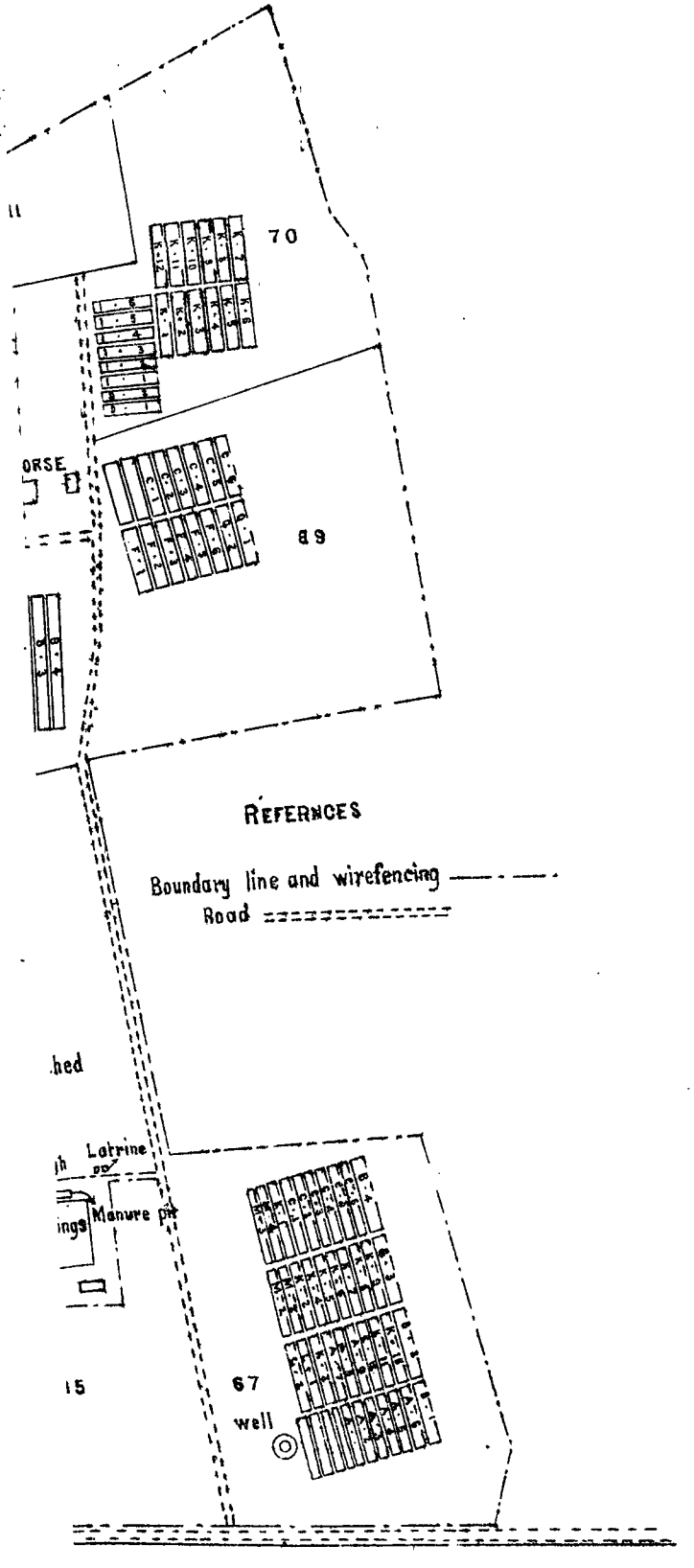
Statement showing the receipts for the year 1913-14.

Head of receipts.	Average for previous five years, *i. e.*, from 1908-09 to 1912-13.	Receipt for the year 1912-13.	1913-14.			Total.
			Value of seed supplied free.	Value of seed supplied on loan.	Actual amount credited in treasury.	
1	2	3	4	5	6	7
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Sale-proceeds of Farm produce.	5,964 11 3	5,514 7 11	70 5 5	...	6,012 8 9	6,082 14 2
Other receipts ...	971 0 8	...	...	...	195 8 9	195 8 9
Nawagaon Reserve Receipt ..	628 5 5	1,047 9 0	...	...	402 8 0	402 8 0
Total ...	7,564 1 4	6,562 0 11	70 5 5	...	6,610 9 6	6,680 14 11

Statement showing the expenditure for the year 1913-14.

Expenditure.	Average for five years from 1908-09 to 1912-13.	Actual for the year 1912-13.	Actual for the year 1913-14.
1	2	3	4
	Rs. a. p.	Rs. a. p.	Rs. a. p.
Establishment Charges.			
Establishment pay	3,784 2 7	2,335 2 6	2,805 1 11
Travelling allowance	109 3 0	168 2 6	103 1 3
Total ...	3,893 5 7	2,503 5 0	2,908 3 2
Supplies and Services.			
Seed and grain	137 6 7	21 2 0	98 13 3
Building and roads	234 15 1	49 10 0	18 4 0
Purchase of cattle and implements	349 10 9	950 8 0	46 14 0
Feed and care of cattle	818 8 3	861 14 9	1,044 10 2
Variable labour	2,354 7 5	4,196 9 0	4,343 2 11
Manure	377 0 7	300 5 9	934 2 8
Miscellaneous	2,565 1 5	1,285 7 5	1,717 8 8
Purchase of land	220 0 0	...	...
Purchase of materials for chain pump	230 11 11	...	...
Purchase of books	29 2 7	145 13 0	3 12 0
Total ...	7,317 0 7	7,811 5 11	8,207 3 11
Contingencies.			
Postage charges	82 10 0	71 0 0	63 6 0
Telegram charges	4 10 0	1 11 0	...
Country stationery	2 13 5	0 4 0	2 3 0
Conveyance of forms	0 4 10	1 8 0	4 2 0
Carriage of stationery	1 1 2	5 6 0	0 10 0
Total ...	91 7 5	79 13 6	70 5 0
Grand Total ...	11,301 13 7	10,394 8 5	11,185 12 1

D. CLOUSTON,
Deputy Director of Agriculture, Southern Circle, Central Provinces.


70
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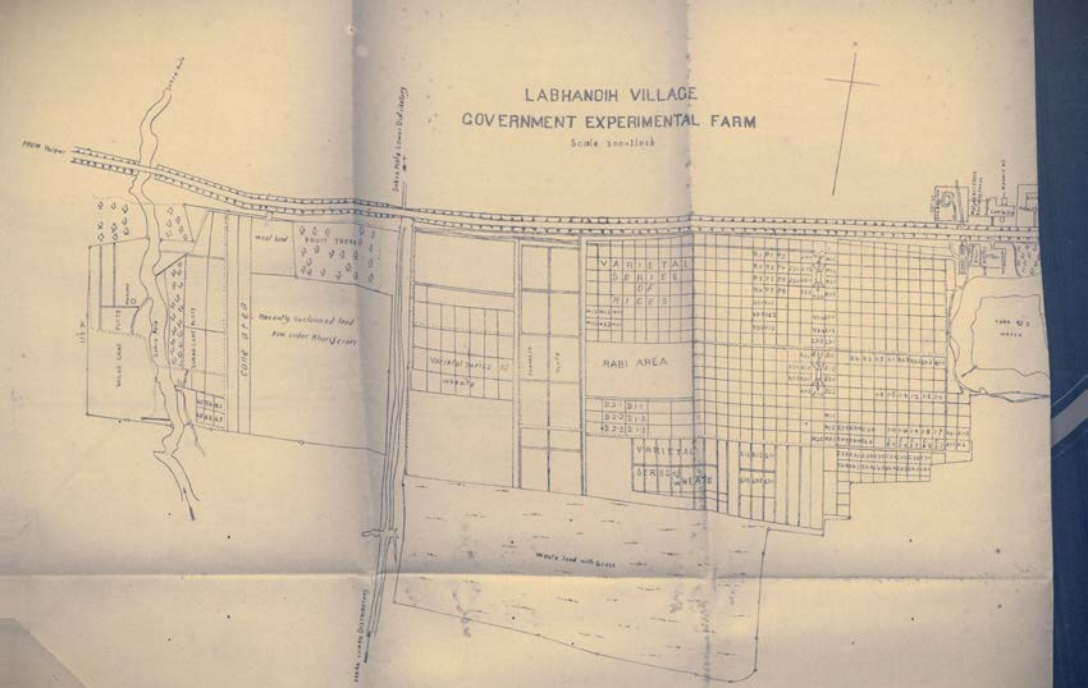
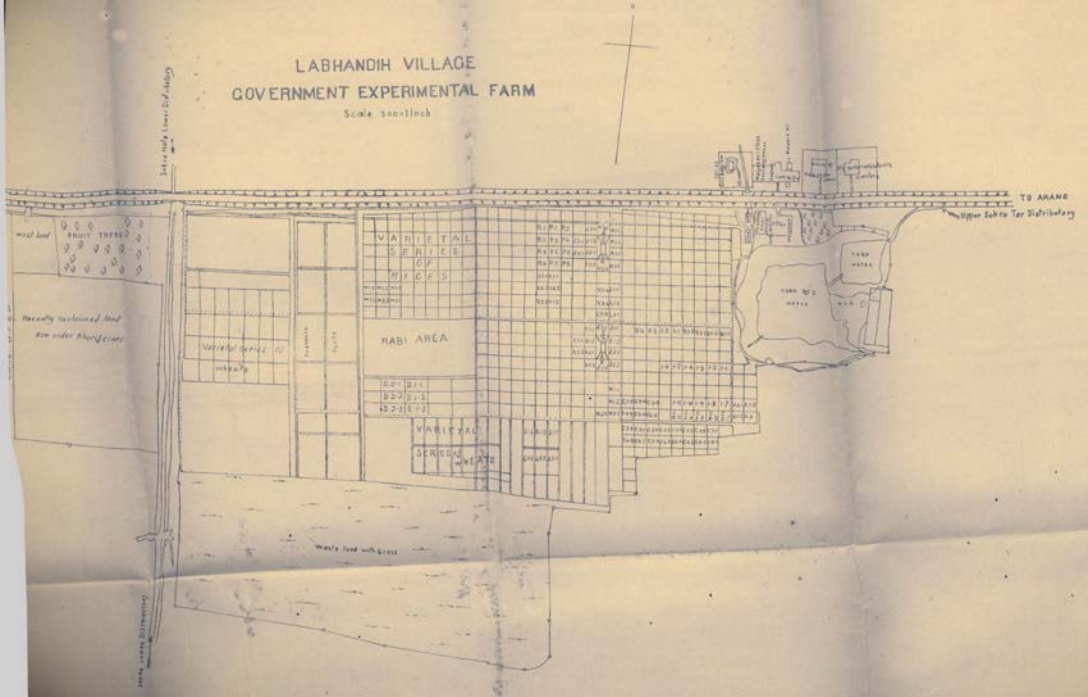

LABHANDIH VILLAGE
GOVERNMENT EXPERIMENTAL FARM
Scale 300=1inch
RABI AREA
CORE AREA


LABHANDIH VILLAGE
GOVERNMENT EXPERIMENTAL FARM
Scale 200=1inch
TO ARANG
Upper Sukra Tar Distributary
FRUIT TREES
VARIETAL SERIES OF PICFS
RABI AREA
VARIETAL SERIES
Waste land with Grass

Report on the Akola Agricultural Station for the year 1913-14.

DESCRIPTION.

This farm is on the Basim road four miles from Akola. It was opened in June 1906, and experimental work was started the following year; the results of experiments for seven years are now available. An area is being standardised with the view of completing the duplication of all the experimental series. In area the farm is 271 acres.

The soil is a deep black clayey loam, typical of the cotton tract. It is subject to water-logging during periods of continuous rain, and cracks readily on the loss of moisture. The analysis is given below:—

	Per cent.
Insoluble silicates and sand	56·11
Peroxide of iron	9·83
Alumina	10·68
Lime	6·59
Magnesia	2·51
Potash	0·37
Soda	0·23
Phosphoric acid	0·08
Sulphuric acid	...
Carbonic acid	4·18
Organic matter and combined water	9·42
Total nitrogen	0·03

Of the total cropped area, 200 acres were under strain No. 1 of Rosea, which gave 39·67 per cent of lint to seed, and which has given on an average 42 lbs. of lint per acre more than the local cotton (Berar Jari) over a period of seven years. We reckon that we have added Rs. 3,940 to the profits of the farm by substituting Rosea for Berar Jari, and that the farming profits of the cultivators of the cotton tract will this year be increased by approximately 10 lakhs of rupees by the distribution of this strain of Rosea through seed farms and Agricultural Unions. If to this we add the increased profits derived from the cultivation of Rosea by those who having received supplies of this seed in previous years now continue to grow it without further assistance from the Department, we get some idea of the extent to which the cultivator has benefited by the introduction of this variety in place of the mixture of six varieties which he formerly grew under the name of Berar Jari.

On the strength of the results obtained from 7 years' experimental work the Department can now with all confidence recommend the following agricultural practices as being economically sound for the cotton tract:—

(*i*) the cultivation of Rosea cotton,

(*ii*) the thinning out of cotton so as to leave the plants from 6″—7″ apart in ordinary soil,

(*iii*) the supplementing of cattle manure with nitrate of soda applied as a top-dressing for cotton,

(*iv*) the conservation of cattle urine by the dry-earth system,

(*v*) the continuous cultivation of cotton on the same land for a period of at least 7 years, in so far as such a system of cropping is consistent with general farm requirements, as regards the raising of fodder and food grains,

(*vi*) that the practice of removing the top shoots of growing cotton plants to stimulate branching should be given up as it reduces the yield, and

(*vii*) that Saoner, Chapti and Ramkel are the best *juars* for medium, heavy and light soils respectively in these Provinces, and should be grown in preference to other varieties.

Four registered Co-operative Agricultural Unions were opened in this Division in the year under report. Seed farms were grouped together at 18 other centres to form embryo Unions. Of these the ten most successful, which have been under trial for a year, are to be registered shortly; this will raise the total number of Unions in Berar to fourteen.

In addition to these Unions, 38 seed farms were run by individuals, who will in due time form Unions with the seed farm in each case as the nucleus of the Union. In starting these Agricultural Unions, it is necessary to select as members men who are good cultivators and at the same time good co-operators. It is more difficult to get good business-like co-operators than good cultivators; it is all important, nevertheless, that the men who run these seed centres should take a keen personal interest in their own cultivation. By starting with what we have designated these embryo or unregistered Unions, we can feel our way, register in due time those that are efficiently managed and leave the members of the rest to manage their own individual seed farms as was done in the past. Each Union undertakes (i) to appoint one paid *kamdar*, (ii) to grow and distribute pure Rosea seed, (iii) to sell the agricultural implements recommended by the Department and (iv) to distribute agricultural leaflets. A short account of the working of each of the four registered Unions will be found at Appendix A to this report. The duty of the *kamdar* is to see that no alien plants are allowed to seed, that the *kapas* is ginned without the seed being mixed with that of other varieties, and that the seed is properly stored and distributed in due course. The only other paid servant to be appointed for the present is an Inspector, who, while under the administrative control of a central bank, will, like the *kamdar*, work under the supervision of our staff. One Inspector is to be appointed as soon as a man suitable for the post can be got.

The plant-to-plant selection of the cottons grown on the farm was continued, and the propagation of the three most promising crosses has been taken in hand. Seed of Bani-Deshi Lahore, the best of the three, will be tried on other farms.

There was as usual a very keen demand for seed grown on the farm; 22,206 lbs. of *juar*, 56,766 lbs. of cotton seed, and 1,635 lbs. of groundnut were supplied to cultivators. All the *kapas* grown on the farm was ginned as usual on the miniature plant, consisting of the Gardner oil-engine and two gins. All the *karbi* used on the farm was chopped by a fodder cutter driven by the same engine. The demand for agricultural implements was good: 240 Turnwrest ploughs were sold during the year—the highest on record.

Cotton was a good crop all over the Division, but the price which in the beginning of the season was Rs. 73 fell in March to Rs. 55 per *khandi* of *kapas*. The outturn of *juar* was slightly below the average.

The farm receipts for the year were Rs. 17,036 and the expenditure, including the salaries of the staff, was Rs. 11,826, leaving a net profit of Rs. 5,210.

The staff worked well during the year. Rai Sahib Bhayalal Dube has, as usual, been very successful in his management of the district work, which is increasing by leaps and bounds. G. M. Joshi, Agricultural Assistant in Buldana, and N. G. Bhoot in Wardha did very good work in connection with the seed farms and Unions in their respective districts.

CHARACTER OF THE SEASON.

The following statement shows the rainfall of the year compared with the average for the last seven years :—

Months.	No. of rainy days.	Rainfall.		Average for 1907 to 1913.		Remarks.
		Inches.	Cents.	Inches.	Cents.	
1	2	3	4	5	6	7
June 1913. 1st half ...	4	2	06	1	71	
" 2nd " ...	5	4	90	4	27	
July " 1st " ...	4	2	62	3	74	
" 2nd " ...	8	7	36	4	02	
August " 1st " ...	3	1	99	4	66	
" 2nd " ...	3	1	31	2	30	
September " 1st " ...	4	5	47	2	56	
" 2nd " ...	2	1	22	1	94	
October " 1st " ...	...	...	...	...	24	
" 2nd " ...	...	...	...	...	...	
November " 1st " ...	...	...	...	...	13	
" 2nd " ...	...	...	...	...	38	
December " 1st " ...	...	...	48	...	13	
" 2nd " ...	...	...	...	...	72	
January 1914. 1st " ...	...	...	...	..	30	
" 2nd " ...	...	...	...	...	...	
February " ... 1st " ...	...	...	...	...	...	
" 2nd " ...	...	...	...	...	3	
March " ... 1st " ...	..	...	...	...	...	
" 2nd " ...	...	...	...	...	14	
April " ... 1st " ...	...	...	...	...	...	
" 2nd " ...	...	...	...	...	...	
May " ... 1st " ...	2	...	56	...	18	
" 2nd " ...	...	...	...	...	3	
Total ...	35	27	97	27	48	

N. B.—A rainy day is taken as one having 10 or more cents rainfall.

A fall of 1·71" in the first half of June and of 4·27" in the second half was obtained, which rendered it possible to sow most of the cotton that month under exceptionally favourable circumstances: the germination of this crop was good in consequence. The rainfall of the last half of July was very heavy and resulted in the water-logging of low-lying areas The rains ceased in the last half of September; the period of continuous dry weather which followed checked the

ripening of both cotton and *juar*. *Juar* being a shallow rooted plant suffered to a greater extent than cotton. For want of moisture the crop gave a comparatively small outturn of grain in proportion to the bulk of fodder produced.

Experiments

SERIES A.—SUBJECT.—Rotation experiments with Rosea cotton as the principal crop. The plots are manured with cattle-dung at the rate of 40 lbs. nitrogen per acre in the year in which cotton is grown, except in the case of plot IX. In plots III and IV there are six lines of cotton to two lines of *tur*.

Area of each plot ·10 of an acre.

No. of plot.	Name of crop.	Average value of outturn per acre for 1907—13.	Crops in 1913 in lbs.	Outturn per acre in 1913 in lbs.		Average net profit per acre.	Remarks.
				Grain and kapas in lbs.	Fodder in lbs.		
1	2	3	4	5	6	7	8
		Rs. a.				Rs. a.	
I	Cotton ... / Wheat ...	42 1	Cotton ...	605	...	29 15	
II	Wheat ... / Cotton ...	34 15	Wheat ...	513	838	23 4	
III	Cotton ... / *Tur* ... / *Juar* ...	31 11	Cotton ... / *Tur* ...	180 / 143	... / 188	20 9	
IV	*Juar* ... / *Tur* ... / Cotton ...	32 6	*Juar* ...	590	2,350	22 0	
V	Cotton ... / Gram ...	37 13	Cotton ...	355	...	25 12	
VI	Gram ... / Cotton ...	39 12	Gram ...	555	800	29 10	
VII	Cotton ... / *Tur* ...	41 12	Cotton ...	302	...	30 14	
VIII	*Tur* ... / Cotton ...	40 4	*Tur* ...	433	488	30 3	
IX	Cotton ...	45 7	Cotton ...	219	...	32 2	

Taking the average value of the outturns per acre over a period of seven years, we find that cotton grown continuously on the same plot has proved to be the most profitable system of cropping and no bad effects from insect pests or soil exhaustion are yet apparent. Continuous cropping with cotton has also been practised on part of the non-experimental area of the farm with the same good result. Of the different rotations under trial, cotton followed by wheat and cotton followed by *tur* have come out best.

Tillage Experiments.

SERIES B.—SUBJECT.—Rosea cotton and wheat are grown in rotation, and the plots are manured as in series A.

No. of plot and treatment.	Outturn is shown in lbs. per acre.				
	Average outturn of wheat for 1907, 1909, 1911 and 1913.		Average outturn of cotton for 1908, 1910 and 1912.	Outturn of wheat for 1913.	
	Grain.	Fodder.		Grain.	Fodder.
1	2	3	4	5	6
I.—*Bakhared* every year in April ...	366	656	589	224	685
II.—Ploughed with native plough and *bakhared* in April.	461	753	563	298	965
III.—Ploughed with turn-wrest plough and *bakhared* in April.	503	833	556	428	990
IV.—Ploughed with turn-wrest plough every third year in April and *bakhared* in other years.	401	797	566	257	920

Duplicate.

No. of plot and treatment.	Outturn is shown in lbs. per acre.				Remarks.
	Outturn of wheat for 1912.		Average outturn of cotton for 1911 and 1913.	Outturn of cotton for 1913.	
	Grain.	Fodder.			
1	2	3	4	5	6
I.—*Bakhared* every year in April ...	428	808	571	712	
II.—Ploughed with native plough and *bakhared* in April.	454	858	585	755	
III.—Ploughed with turn-wrest plough and *bakhared* in April.	490	861	575	765	
IV.—Ploughed with turn-wrest plough every third year in April and *bakhared* in other years.	461	872	565	744	

In this experiment and its duplicate the outturn of wheat has always been greater on the plot ploughed every year with the turn-wrest plough than on any of the others. As a method of cultivation for wheat *bakharing* is inferior to ploughing. The plot ploughed with the turn-wrest plough in the hot weather holds up much more of the rainfall than does the *bakhared* plot. The amount of moisture absorbed by each may be taken as approximately proportional to the amount of loose soil which it contains, and the deeper cultivation effected by the turn-wrest plough therefore gives that plot the advantage for a *rabi* crop, which owing to the light rainfall of this district suffers for want of sufficient moisture.

The advantage of ploughing for cotton—a *kharif* crop—is not so apparent. In a wet year the greater amount of moisture absorbed by the plot, which has been cultivated to a greater depth by the use of the plough, results in delay in getting the seed sown, owing to the wetness of the soil and in the uneven germination of the seed due to water-logging.

SERIES C.—SUBJECT.—Spacing of cotton plants.

The seed is dibbled and the plots manured as in series A. Rosea cotton is grown continuously.

Area of each plot ·10 of an acre per plot.

No. of plot and spacing distances.	Outturn is given in lbs. per acre.	
	Average outturn of *kapas* for 1907—13.	Outturn of *kapas* in 1913.
1	2	3
I. Rows 15" and plants 7" apart in rows ...	520	495
II. „ 15" „ 15" „ ...	503	544
III. „ 20" „ 15" „ ...	517	606
IV. „ 20" „ 20" „ ...	396	416
V. „ 25" „ 20" „ ...	395	326
VI. Unthinned	388	264
	(Average for 1911-13 only)	

Duplicate.

No. of plot and spacing distances.	Outturn is given in lbs per acre.	
	Average outturn of *kapas* for 1909—13.	Outturn of *kapas* for 1913.
1	2	3
I. Rows 15" and plants 7" apart in rows ..	524	707
II. „ 15" „ 15" „ ...	546	696
III. „ 20" „ 15" „ ...	487	641
IV. „ 20" „ 20" „ ...	472	629
V. „ 25" „ 15" „ ...	498	655
VI. Unthinned	518	492
	(Average for 1911-13 only.)	

For the first five years of this experiment a spacing distance of 15 inches from row to row and 7 inches from plant to plant gave the highest outturn. As the plot increases in fertility, however, owing to the accumulation of the residues of the manure applied every year a wider spacing distance has given better results. The more fertile soil produces larger plants which require more room. The practice followed by some cultivators of allowing all the plants, which come up, to mature is a bad one. For soil of medium fertility, the spacing followed by plot I of each series is probably the best.

SERIES D.—SUBJECT—To ascertain the comparative advantages of topping plants, the plants being topped when about 1 foot high. Rosea cotton is grown continuously. The plots are manured as in series A.

Area of each plot ·10 of an acre.

No. of plot and treatment.	Outturn is given in lbs. per acre.		Remarks.
	Average outturn of *kapas* for 1907—13.	Outturn of *kapas* in 1913.	
1	2	3	4
I. Topped	480	314	
II. Not topped	523	353	

Duplicate.

No. of plot and treatment.	Outturn is given in lbs. per acre.		Remarks.
	Average outturn of *kapas* for 1908—13.	Outturn of *kapas* in 1913.	
1	2	3	4
I. Topped	330	273	
II. Not topped	373	327	

The outturn of a cotton plant of the habit of growth of Jari is decreased by removing the top-shoot when young; cultivators have therefore been advised to give up this practice, as it involves considerable expenditure which gives no return.

SERIES E.—SUBJECT.—To ascertain the relative values of the outturns of different cottons. The plots are manured as in series A.

Area of each plot ·10 of an acre.

No. of plot.	Variety.	Outturn given in lbs. per acre.			Value of outturn per acre in 1913.	Remarks.
		Average outturn of lint from 1907—13.	Outturn of *kapas* in 1913.	Yield of lint in 1913.	Based on Nagpur prices.	
1	2	3	4	5	6	7
					Rs. a.	
I	Gossypium neglectum malvensis ..	132	435	130·90	47 8	
II	Do. vera ..	146	494	168·25	61 1	
III	Do. rosea ...	204	509	204·41	70 5	
IV	Do. rosea cutchica	190	553	203·89	70 0	
V	Berar jari ...	162	478	162·00	55 9	
VI	Saugor jari ...	156 (Average only for 1911-13.)	441	143·32	49 2	
VII	Bani ...	97	437	111·87	47 15	
VIII	Buri ...	121	436	148·50	63 12	

Rosea has in the year under report given for lint alone a clear profit of nearly Rs. 15 per acre over Berar Jari, the name applied to the mixture of varieties which held the field previous to the introduction of pure Rosea by the Department. The valuation of these cottons by the Director of the Imperial Institute is given in Appendix B.

Taking the average for seven years we find that Rosea has on an average given 14 lbs. of lint per acre more than Rosea cutchica, the next best yielder in order of merit. Compared with ordinary Berar Jari, Rosea has given an increase of 42 lbs. per acre worth Rs. 10; while compared with Bani, the variety recommended by the Department for general cultivation till nine years ago, it has given an increase worth about Rs. 22 an acre. On the strength of the results obtained in this series, corroborated by still more practical results obtained from the non-experimental area of the farm, as well as in hundreds of villages in the mofussil, Rosea seed is being distributed on a very large scale. About one million seven hundred and four thousand lbs. were distributed this year through Agricultural Unions and seed farms. When we take into consideration the fact that many cultivators having no connection with Unions or seed farms have in previous years obtained supplies of seed of this variety, with which they are gradually replacing the less profitable mixed staple, we get some idea of the rate at which Rosea is gaining ground in these Provinces.

SERIES F.—SUBJECT.—To ascertain how far the different varieties of cotton grown in the Provinces can be improved by selection. Cotton is grown continuously and the plots are manured as in series A.

Area of each plot ·10 of an acre.

No. of plot.	Variety.	Outturn is given in lbs. per acre.	
		Average outturn of cotton from 1909—1913.	Outturn for 1913.
1	2	3	4
I	Rosea No. I (selected) ...	645	582
II	Rosea (unselected) ...	625	526
III	Bani No. III (selected) ...	522	469
IV	Bani (unselected) ...	529	487
V	Buri No. I (selected.) ...	446	633
VI	Buri (unselected) ...	457	590

Duplicate.

No. of plot.	Variety.	Outturn is given in lbs. per acre.	
		Average outturn of cotton from 1910—1913.	Outturn for 1913.
1	2	3	4
I	Rosea No. I (selected) ...	633	930
II	Rosea (unselected) ...	535	849
III	Bani No. III (selected) ...	421	585
IV	Bani (unselected) ...	441	674
V	Buri No. I (selected) ...	304	542
VI	Buri (unselected) ...	269	849

No. 1 Rosea, which was put first in the list of strains, the mother plants of which were selected in 1908, has continued to give big yields and high percentages of lint to seed. This is the strain which we are now growing on the experimental farm and seed farms of the cotton tract. We are trying to improve this variety in respect to yield and percentage of lint to seed by continuous selection year after year. It has not yet been definitely ascertained how far this is possible; but the system at least provides against the possibility of the strain deteriorating.

The selected strain of Buri is more prolific than the unselected cotton of this variety with which it has been compared.

The selected strain of Bani, on the other hand, has proved to be less prolific than the unselected cotton of the same variety. The reason of this probably is that, while Rosea and Buri were selected on the strength of their high yields of *kapas*, we selected strain No. 3 of Bani on account of the promise it gave of yielding a high percentage of lint to seed. The lint percentage of No. 3 when selected six years ago was 29 as compared with 26 for ordinary Bani. This particular selected strain, however, is a poor yielder and its percentage of lint to seed has since dropped to 27.

SERIES G.—SUBJECT.—To ascertain the relative values of cattle-dung, saltpetre and poudrette, as manures for cotton and *juar* grown in rotation. The manure is applied in the year in which cotton is grown.

Area of each plot ·10 of an acre.

No. and treatment of plot.	Outturn is given in lbs. per acre.				Value of outturn in 1913 due to manure.	Net profit in 1913 due to manure.
	Average outturn of *juar* for 1908, 1910 and 1912.		Average outturn of *kapas* for 1907, 1909, 1911 and 1913.	Outturn of cotton for 1913.		
	Grain.	Fodder.				
1	2	3	4	5	6	7
				Lbs.	Rs. a. p.	Rs. a. p.
I. 64 maunds of cattle-dung per acre.	511	2,940	339	433	50 4 0	3 8 0
II. *Nil* ...	440	1,733	284	420	48 12 0	...
III. 64 maunds of poudrette.	568	2,157	431	609	70 11 0	16 15 0
IV. 2 maunds of saltpetre ...	578	2,243	346	463	53 12 0	8 10 0

Poudrette is easily the most economical manure to apply to cotton at present prices. A dressing of two maunds of saltpetre per acre has, in the year under report, given a better account of itself than the 64 maunds of cattle-dung applied to plot 1.

SERIES H.—SUBJECT.—To ascertain the profit to be derived from the use of fertilisers as manures for cotton grown on black cotton soil. The superphosphate, sulphate of potash and sulphate of ammonia are drilled in at the time of sowing at the rate of 40 lbs. phosphoric acid, 35 lbs. of potash and 20 lbs. nitrogen per acre respectively. The nitrate of soda is applied as a top-dressing at the rate of 20 lbs. nitrogen per acre.

Area of each plot is ·10 of an acre.

No. of plot.	Manures.	Outturn is given in lbs. per acre.	
		Average outturn of *kapas* from 1910—1913.	Outturn of *kapas* for 1913.
1	2	3	4
I	Nitrate of soda, superphosphate and potassium sulphate.	660	889
II	Nitrate of soda and superphosphate.	679	862
III	Do. and potash ...	563	779
IV	Nitrate of soda ...	496	609
V	Ammonium sulphate ...	469	624
VI	No manure ...	403	434
VII	Calcium nitrate ...	491	507
VIII	Superphosphate and sulphate of potash.	501	576
IX	Superphosphate ...	500	548
X	Sulphate of potash ...	413	419

Nitrate of soda is the most effective of the manures tried in this series Applied in combination with superphosphate and potash it has doubled the yield. Sulphate of potash applied by itself is of no manurial value to the black cotton soil of this farm. The soil would appear to be rich in potash, but deficient in nitrogen and phosphoric acid.

SERIES I.—SUBJECT.—To test the manurial value of a dressing of cattle-dung, followed by a top-dressing of nitrate of soda or saltpetre after the plants have been thinned out. Cotton is grown continuously.

Area of each plot ·10 of an acre.

No. and treatment of plot.	Outturn is given in lbs. per acre.		Value of produce.	Cost of manure.	Net profit due to manure.
	Average outturn of cotton from 1907 to 1913.	Outturn of cotton for 1913.			
1	2	3	4	5	6
			Rs. a.	Rs. a.	Rs. a.
I. Cattle-dung 64 maunds plus 10 lbs. nitrogen as nitrate of soda.	649	731	84 14	12 3	38 5
II. Cattle-dung 32 maunds plus 20 lbs. nitrogen as nitrate of soda.	596	667	77 7	17 9	25 8
III. No manure	333	296	34 6	*Nil.*	...
IV. Cattle-dung 64 maunds plus 10 lbs. nitrogen as saltpetre.	631	654	75 15	11 9	30 0
V. Cattle-dung 32 maunds plus 20 lbs. nitrogen as saltpetre.	565	608	70 9	15 10	2 9

Duplicate.

No. and treatment of plot.	Outturn is given in lbs. per acre		Value of produce.	Cost of manure.	Net profit due to manure.
	Average outturn of cotton from 1910—13.	Outturn of cotton for 1913.			
1	2	3	4	5	6
			Rs. a.	Rs. a.	Rs. a.
I. Cattle-dung 64 maunds plus 10 lbs. nitrogen as nitrate of soda.	434	518	60 2	12 3	19 15
II. Cattle-dung 32 maunds plus 20 lbs. nitrogen as nitrate of soda.	482	531	61 10	17 9	16 1
III. No manure	222	241	28 0	*Nil.*	...
IV. Cattle-dung 64 maunds plus 10 lbs. nitrogen as saltpetre.	395	438	50 14	11 9	11 5
V. Cattle-dung 32 maunds plus 20 lbs. nitrogen as saltpetre.	388	474	55 0	15 10	11 6
VI. 64 maunds cattle-dung ...	312	280	32 8	5 0	0 8

The application of cattle-dung, followed by a top-dressing of nitrate of soda in one case and of saltpetre in the other, has again added largely to the acreage net profit. Nitrate of soda has given a better account of itself than saltpetre and the larger quantity of cattle-dung followed by a smaller dressing of the fertilizer has given the larger profits. We consider that we are now justified in recommending the use of nitrate of soda as a manure for cotton on condition that it is applied in conjunction with cattle-dung as is done in this experiment. Arrangements have therefore been made with Messrs. Allan Brothers, Cawnpore, to keep a stock of this fertilizer on the farm for sale in the cotton tract. Four tons have already been sold this year. It has been observed that nitrate of soda, while increasing the yield, accelerates the maturing of cotton.

SERIES J.—SUBJECT.—To determine the comparative value of cattle-dung and urine as manures for cotton, the urine being conserved by the dry-earth system. Cotton and *juar* are grown in rotation, and the manure is applied every year.

Area of each plot ·10 of an acre.

No. and treatment of plot.	Outturn is given in lbs. per acre.				Value of produce in 1913.	Cost of manure.	Net profit due to manure.
	Average outturn of *juar* for 1908, 1910 and 1912.		Average outturn of *kapas* for 1907, 1909, 1911 and 1913.	Outturn of cotton for 1913.			
	Grain.	Fodder.					
1	2	3	4	5	6	7	8
					Rs. a.	Rs. a.	Rs. a.
I. Dung and urine of two cattle for 30 days.	891	3,900	601	628	72 15	7 8	34 9
II. Dung alone of two cattle for 30 days.	769	2,690	440	456	52 15	5 0	17 1
III. No manure ...	512	1,975	284	266	30 14	*Nil.*	...
IV. Urine alone of two cattle for 30 days.	745	2,793	444	425	49 6	2 8	16 0

Duplicate.

No. and treatment of plot.	Outturn is given in lbs. per acre.					Value of produce in 1913.	Cost of manure.	Net profit due to manure.
	Average of *juar* for 1911 and 1913.		Average of *kapas* for 1910 and 1912.	Outturn of *juar* in 1913.				
	Grain.	Fodder.		Grain.	Fodder.			
1	2	3	4	5	6	7	8	9
						Rs. a.	Rs. a.	Rs. a.
I.—Dung and urine of two cattle for 30 days.	505	2,263	453	229	2,560	34 8	7 8	11 0
II.—Dung alone of two cattle for 30 days.	428	2,365	385	225	1,900	28 6	5 0	7 6
III.—No manure ...	267	1,805	277	95	1,250	16 0	*Nil.*	...
IV.—Urine alone of two cattle for 30 days.	388	2,780	365	184	2,050	27 11	2 8	9 3

The average outturns of *juar* for a period of three years in the one series and for two in the other, show that the manurial value of the urine of a bullock is almost equal to that of its solid excreta. The outturns of *kapas* this year from the same plots corroborate this.

SERIES K.—SUBJECT.—To compare the outturn of local and other *juars.*

No. of plot.	Name of juar.	Outturn is given in lbs. per acre,				Remarks.
		Average outturn from 1909—1913.		Outturn for 1913.		
		Grain.	Fodder.	Grain.	Fodder.	
1	2	3	4	5	6	7
I	Saoner ...	685	2,485	404	2,050	
II	Ramkel ...	598	1,950	378	1,310	
III	Perio ...	389	1,884	364	1,600	
IV	Lahi long ...	522	1,542	379	1,380	
V	Lahi round ...	416	1,460	396	1,630	
VI	Natora ...	272	1,532	319	1,870	
		(For 1912 and 1913 only.)				
VII	Dukria ...	423	748	235	1,620	
VIII	Lamkansi ...	534	1,836	473	1,830	
IX	Dabhadi Jad ...	...	...	383	2,040	
X	Motia ...	...	...	381	1,760	
XI	Chapti ...	621	2,390	404	1,700	
XII	Hauri ...	533	2,197	385	2,000	

Duplicate.

No. of plot.	Name of *juar*.	Outturn given in lbs. per acre.				Remarks.
		Average of *juar* for 1909—1913.		Outturn of *juar* for 1913.		
		Grain.	Fodder.	Grain.	Fodder.	
1	2	3	4	5	6	7
I	Saoner ...	637	1,772	639	1,772	
II	Ramkel ...	614	1,656	521	1,200	
III	Perio ...	489	2,083	449	1,310	
IV	Lahi long ...	492	1,510	261	1,250	
V	Lahi round ...	387	1,365	281	1,250	
VI	Natora ...	277	1,103	263	1,100	
VII	Dukria ...	...	...	460	1,180	
VIII	Lamkansi ...	543	2,012	450	1,300	
IX	Dabhadi Jad ...	...	...	285	1,180	
X	Havari ...	615	2,025	325	1,600	
XI	Chapti ...	585	1,522	479	1,280	
XII	Motia (Alaspuri) ...	...	...	369	1,490	

Taking the average outturn for each of the two series we find that Saoner stands first in the list. Chapti and Ramkel are also promising varieties Saoner is the best all round *juar* under trial. Seed of this variety has been distributed in large quantities in Berar: it is now fairly well known all over the Division.

SERIES M.—SUBJECT.—To determine whether it is profitable to sow *juar* and cotton before the rains. These crops are grown in rotation. The plots are manured as in series A.

Area of each plot ·10 of an acre.

No. of plot.	Crops.	Outturn is given in lbs, per acre.					
		Average outturn of *kapas* from 1909 to 1913	Average outturn of *juar* for 1909—1913.		Outturn of *kapas* for 1913.	Outturn of *juar* for 1913.	
			Grain.	Fodder.		Grain.	Fodder.
1	2	3	4	5	6	7	8
I	Cotton sown before the rains ...	451	...	...	428	...	...
II	Cotton sown at usual time, *i. e.*, after rains break.	410	...	...	353	...	...
III	*Juar* sown before the rains ...	...	584	2,247	...	289	1,950
VI	*Juar* sown at usual time, *i. e.*, after rains break.	...	645	2,369	...	573	2,270

Cotton sown before the rains in Plot I gave an increase of 75 lbs. of *kapas* over that sown at the usual time. The pre-monsoon sowing of cotton is so promising that it is now practised on a large scale on the non-experimental area of the farm. The *juar* sown before the rains was again damaged by stem borer, which accounts for the poor outturn obtained from Plot III. The yields for the year are in keeping with those of previous years.

SERIES N.—SUBJECT.—To test the value of gram as a soil renovator when grown along with cotton, the gram being sown between the rows of cotton after the last weeding of the latter.

No. of plot and treatment.	Outturn is given in lbs. per acre.					
	Average outturn for 1908—13.			Outturn for 1913.		
	Cotton.	Gram.		Cotton.	Gram.	
		Grain.	Fodder.		Grain.	Fodder.
1	2	3	4	5	6	7
I. Cotton with gram	397	58	102	249	*Nil.*	*Nil.*
II. Cotton without gram	380	...	...	245	...	...

In this series gram is sown between the rows of cotton in September, *i. e.*, after completing the last weeding of the main crop, the idea being to renovate the soil in nitrogen. The increase obtained from the cotton-gram plot is not sufficiently large to justify the assumption that the leguminous crop has enriched the soil to any material extent. The growth of gram was stunted and no grain was obtained.

SERIES P.—SUBJECT.—To ascertain the effects of irrigation on cotton. The plots are manured as in series A.

Area of each plot ·10 of an acre.

No. and treatment of plot.	Outturn is given in lbs. per acre.		No. of waterings.	Remarks.
	Average outturn of *kapas* for 1911—13.	Outturn of *kapas* in 1913.		
1	2	3	4	5
I. Buri (irrigated)	324	466	5	
II. „ (unirrigated)	260	387	...	
III. Rosea (irrigated)	603	474	5	
IV. „ (unirrigated)	584	636	...	

The yields obtained from these series indicate that Buri and Rosea cotton grown on the stiff black cotton soil of Berar are but little benefited by irrigation.

SERIES Q.—Statement showing the effect of heavy and light seed.

No. and treatment of plot.	Outturn of *kapas* per acre for 1913.	Value realized per acre.	Remarks.
1	2	3	4
		Rs. s.	
I. Heavy seed	642	74 8	
II. Light seed	525	60 15	

Duplicate.

No. and treatment of plot.	Outturn of *kapas* per acre for 1913.	Value realized per acre.	Remarks.
1	2	3	4
		Rs. a.	
I. Heavy seed	494	57 6	
II. Light seed	478	55 8	

The light seed was separated from the heavy by immersing the whole in a solution of common salt and water in which case the lighter seed floated. In the series under review the heavy seed gave the higher yield in both.

Statement of Rates.

Name of Crop.	Value. Rate.	Value. Per	Remarks.
1	2	3	4
	Rs. a. p.		
Rosea *Kapas*	65 0 0	*Khandi* of 560 lbs.	
Jari cotton lint	103 0 0		
Bani	125 0 0		
Malvensis	107 0 0		
Vera	110 0 0	*Baja* of 345 ,,	
Rosea	107 0 0		
Cutchica	105 0 0		
Buri	133 0 0		
Wheat	1 0 0	16 ,,	
Gram	1 0 0		
Tur	1 0 0	24 ,,	
Juar	1 0 0	20 ,,	
Juar Karbi	9 0 0	1000 ,,	
Bhusa	1 0 0	100 ,,	
Nitrate of soda	13 8 0		
Sulphate of ammonia	13 0 0		
Superphosphate	7 0 0	112 ,,	
Sulphate of potash	11 8 0		
Nitrate of potash	9 8 0		
Cattle-dung	1 0 0	Cart load.	
Poudrette	1 0 0		
Urine earth	2 8 0	Acre.	
Calcium nitrate	13 6 0	112 ,,	

Statement of Receipts and Expenditure during the year 1913.

Head.	Total expenditure during 1913.	Remarks.
1	2	3
Receipts.	Rs. a. p.	
Sale of produce	11,133 5 11	
Distribution of seeds	4,710 11 2	
Miscellaneous	1,192 2 0	
Total ...	17,036 3 1	
Expenditure.		
Establishment	3,479 9 8	
Travelling allowance	83 1 3	
Total ...	3,562 10 11	
Purchase of seed	33 8 6	
Farm building	25 0 0	
Construction and repairs of roads and irrigation	53 13 6	
Purchase of cattle and implements	676 7 3	
Variable labour	4,809 7 6	
Feed and care of cattle	765 8 10	
Manure	475 7 3	
Miscellaneous	1,194 7 0	
Postage and Telegrams	206 2 6	
Country stationery	0 7 0	
Carriage of stationery	11 7 0	
Conveyance of forms	2 4 0	
Purchase of books	9 11 0	
Total ...	8,263 11 4	
Grand Total ...	11,826 6 3	

D. CLOUSTON,

Deputy Director of Agriculture,

Southern Circle,

Central Provinces.

APPENDIX A.

IMPERIAL INSTITUTE.

RESULTS OF THE EXAMINATION OF COTTON FROM INDIA.

Imperial Institute No. 52066-1, *dated the* 12*th May* 1914.

Variety of cotton	...	Rosea.
Description—		
Lint	...	Clean, harsh, moderately lustrous, of cream colour and free from stains. A few seeds were present in the sample.
		Yield of lint on ginning ... 39·9 per cent.
		Yield of lint per 100 seeds ... 4·19 grammes.
Seeds	...	Small, and covered with a short brown fuzz.
Strength	...	Good.
Length of fibres	...	From 0·7 to 1 1 inch; mostly from 0·7 to 0·9 inch.
Commercial valuation	...	6*d* per lb. (nominal) with middling American (April "futures") at 6·9*d* per lb.
Remarks	...	These thirteen cottons were clean and of very satisfactory quality. Most of them were rather too short, coarse and rough to be readily saleable in the Liverpool market, but Nos. 55066-7 and 8 (Bani III and Buri II) and 52370-1 (Buri I) were regarded by the commercial experts as representing a style of cotton for which there is generally a good demand.
		On the date of valuation of these cottons, the following "current" prices were quoted in Liverpool :—
		Middling American ... 7·26*d* per lb.
		Fine machine-ginned Broach ... 6¼*d* do.
		Fine machine-ginned Bengals ... $5\frac{13}{16}d$ do.

Variety of cotton	...	Cutchica.
Description—		
Lint	...	Clean, very harsh, moderately lustrous, of cream colour and free from stains.
		Yield of lint on ginning ... 37·9 per cent.
		Yield of lint per 100 seeds ... 4·04 grammes.
Seeds	...	Small, and covered with short greyish brown fuzz.
Strength	...	Fair.
Length of fibres	...	From 0·5 to 0·9 inch; mostly from 0·5 to 0·7 inch.
Commercial valuation	...	6*d* per lb. (nominal) with middling American (April "futures") at 6·9*d* per lb.
Remarks	...	As for Rosea.

Variety of cotton ... Vera.

Description—

Lint ... Clean, harsh, moderately lustrous, of cream colour and practically free from stains.

Yield of lint on ginning ... 33·8 per cent.

Yield of lint per 100 seeds ... 3·19 grammes.

Seeds ... Small, and covered with short greyish-brown fuzz.

Strength ... Fairly good.

Length of fibres ... From 0·6 to 1·1 inch; mostly from 0·7 to 0·9 inch.

Commercial valuation ... 6½*d* per lb. (nominal) with middling American (April "futures") at 6·9*d* per lb.

Remarks ... As for Rosea.

Variety of cotton ... Malvensis.

Description—

Lint ... Clean, harsh, fairly lustrous, and of cream colour, with a few small yellowish or brownish stains.

Yield of lint on ginning ... 28·6 per cent.

Yield of lint per 100 seeds ... 2·25 grammes.

Seeds ... Small, and covered with greyish or greenish fuzz.

Strength ... Somewhat irregular; on the whole fairly good.

Length of fibres ... Slightly irregular; from 0·6 to 1·1 inch, mostly from 0·6 to 0·8 inch.

Commercial valuation ... 6*d* per lb. (nominal) with middling American (April "futures") at 6·9*d* per lb.

Remarks ... As for Rosea.

Variety of cotton ... Saugor Jari.

Description—

Lint ... Clean, harsh, moderately lustrous, and of cream colour, with occasional small brownish stains.

Yield of lint on ginning ... 32·7 per cent.

Yield of lint per 100 seeds .. 2·37 grammes.

Seeds ... Small, and covered with short brownish or greyish fuzz.

Strength ... Fair; a small quantity of weak immature fibre was present.

Length of fibres ... From 0·5 to 1·0 inch; mostly from 0·6 to 0·8 inch.

Commercial valuation ... 5¾*d* per lb. (nominal) with middling American (April "futures") at 6·9*d* per lb.

Remarks ... As for Rosea.

Variety of cotton ... Bani.

Description—

Lint ... Clean, fairly soft, moderately lustrous and of cream colour, with a few brownish stains.

Yield of lint on ginning ... 29·5 per cent.

Yield of lint per 100 seeds ... 1·92 grammes.

Seeds ... Small, and in some cases covered with grey fuzz of medium length, whilst other seeds were covered with short brown fuzz.

Strength ... On the whole, good. A small quantity of week immature fibre was present.

Length of fibres ... Somewhat irregular; from 0·4 to 1·2 inch; mostly from 0·7 to 0·9 inch.

Commercial valuation ... 6⅛*d* per lb. (nominal) with middling American (April "futures") at 6·9*d* per lb.

Remarks ... As for Rosea.

Variety of cotton ... Buri.

Description—

Lint ... Clean, fairly soft and lustrous, and of cream colour, with a few small yellowish-brown stains.

Yield of lint on ginning ... 32·5 per cent.

Yield of lint per 100 seeds ... 3·87 grammes.

Seeds ... Of medium size, and covered with long white or brownish fuzz.

Strength ... Fairly good.

Length of fibres ... From 0·5 to 1·2 inch; mostly from 0·8 to 1·0 inch.

Commercial valuation ... 6¼*d* per lb. (nominal) with middling American (April "futures") at 6·9*d* per lb.

Remarks ... As for Rosea.

Variety of cotton ... Bani x Rosea.

Description ... Unginned cotton.

Lint ... Clean, fairly soft and lustrous, of pale cream colour and free from stains.

Yield of lint on ginning ... 31·9 per cent.

Yield of lint per 100 seeds ... 2·69 grammes.

Seeds ... Small, and covered with short greyish-brown fuzz.

Strength ... Good.

Length of fibres ... From 0·7 to 1·1 inch; mostly from 0·8 to 1·0 inch.

Commercial valuation ... 5⅞*d* per lb. (nominal) with middling American (April "futures") at 6·9*d* per lb.

Remarks ... As for Rosea.

Variety of cotton ... Bani x Deshi Lahore.

Description—

Lint ... Clean, rather harsh, moderately lustrous, of pale cream colour and almost free from stains.

Yield of lint on ginning ... 37·5 per cent.

Yield of lint per 100 seeds ... 3·00 grammes.

Seeds ... Small, and covered with white or brownish fuzz of medium length.

Strength ... Fairly good.

Length of fibres ... From 0·7 to 1·2 inch; mostly from 0·8 to 1·0 inch.

Commercial valuation ... 6*d* per lb. (nominal) with middling American (April "futures") at 6·9*d*. per lb.

Remarks ... As for Rosea.

Variety of cotton ... Bani x Mathio.

Description ... Unginned cotton.

Lint ... Clean, fairly soft and lustrous, of pale cream colour and practically free from stains.

Yield of lint on ginning ... 31·0 per cent.

Yield of lint per 100 seeds ... 1·83 grammes.

Seeds ... Small and covered with short greyish, greenish or brownish fuzz.

Strength ... Good.

Length of fibres ... From 0·5 to 1·2 inch; mostly from 0·7 to 0·9 inch.

Commercial valuation ... 5¼*d* per lb. (nominal) with middling American (April "futures") at 6·9*d*. per lb.

Remarks ... As for Rosea.

Variety of cotton ... Buri.

Description—

Lint ... Clean, rather harsh, fairly lustrous, of cream colour and practically free from stains.

Yield of lint on ginning ... 30·7 per cent.

Yield of lint per 100 seeds ... 3·89 grammes.

Seeds ... Of medium size, and covered with rather long greyish or greenish fuzz.

Strength ... Fair.

Length of fibres ... From 0·7 to 1·2 inch; mostly from 0·9 to 1·1 inch.

Commercial valuation ... 6¼*d* per lb. (nominal) with middling American (April "futures") at 6·9*d* per lb.

Remarks ... As for Rosea.

Variety of cotton	...	Cultivator's Jari.
Description—		
Lint		Clean rather harsh, moderately lustrous, of cream colour and practically free from stains. Several seeds were present in the sample.
		Yield of lint on ginning ... 36·5 per cent.
		Yield of lint per 100 seeds ... 3·32 grammes.
Seeds	...	Small, and covered with short greyish, brownish or greenish fuzz.
Strength	...	Fairly good.
Length of fibres		From 0·6 to 1·1 inch; mostly from 0·7 to 0·9 inch.
Commercial valuation	..	$5\frac{7}{8}d$ per lb. (nominal) with middling American (April "futures") at $6·9d$ per lb.
Remarks	...	As for Rosea.

Report on the Agricultural Station, Sindewahi.

1. With the view of furthering the sugarcane industry in Chanda District, the village and tank of Garmausi near Sindewahi were acquired in 1912. The village comprises an area of 2,748·91 acres, of which 390·64 are culturable. Of the culturable area, 200·00 acres were set aside for the experimental farm. It has been decided by the Local Administration, that in future the remaining area will be managed as a ryotwari village, of which the tenants will be Government tenants and the Superintendent of the farm the Patel.

2. The surface of the area selected for the experimental farm was very uneven and much scouring took place every year. This has been remedied to some extent by levelling up the low-lying areas, and by constructing stone bunds to check scouring and the loss of silt.

3. The whole area has been divided up into four distinct blocks, *i. e.*, for cane, cotton, rice and *rabi*.

Some experiments have been started, while land for others is being standardised.

4. The farm buildings and roads are nearing completion and a small power cane crusher is being set up.

5. An area of 20 acres of cane was grown on the farm in the year under review; the crop was very good, especially that part of it planted in October and November. One plot of experimental cane planted in October yielded 48 tons of stripped cane per acre.

6. Twenty-nine thousand six hundred and forty canes were supplied for seed purposes; the rest of the farm crop was made into *gur* by the Poona system.

7. Cotton grown under irrigation on this farm again gave a very large acreage outturn; that of Rosea amounted to 1,335 lbs. of *kapas*. Buri and Cambodia gave 1,063 lbs. and 790 lbs. of *kapas*, respectively.

8. Groundnut grown on the *wardi* soil on the farm gave an outturn of 863 lbs. per acre.

9. A meeting of cultivators interested in cane and cotton cultivation was held on the farm in January; there were about 1,000 people present. Prizes for exhibits of cane and groundnut sent in were given, and the advantages of growing cotton and cane and of making *gur* by the Poona system were fully explained.

Mr. Moharikar did very good work as Superintendent of the farm, but is not quite experienced enough to do justice to the manifold problems which arise in connection with the duties of the Superintendent as Patel of Garmausi village.

Statement of rainfall for the year 1913-14.

Month.	Rainfall.		Total.	Remarks.
	First fortnight.	Second fortnight.		
June	2·84	3·77	6·61	
July	8·46	11·54	20·00	
August	4·39	7·28	11·67	

Month.	Rainfall.		Total.	Remarks.
	First fortnight.	Second fortnight.		
September	8·95	...	8·95	
October	0·53	...	0·53	
November	...	0·16	0·16	
December	...	...	...	
January	...	...	...	
February	...	...	...	
March	...	0·52	0·52	
April	1·58	0·03	1·61	
May	0·50	...	0·50	
Total ...	27·25	23·30	50·55	

The monsoon broke on the 5th of June. In the first half of that month the rainfall amounted to 2·84 and in the second half to 3·77 inches. The sowing of rice and cotton was completed in good time and under favourable conditions. By the middle of September the monsoon had stopped short: from that time till the middle of March, the rainfall amounted 0·69 inch only. This long break necessitated the regular irrigation of cane till the time of harvesting the crop. The total rainfall for the year amounted to 50·55 inches; this was not quite sufficient to fill the Garmausi tank, on which the experimental farm, Government tenants of Garmausi and cultivators of Sindewahi and Lonewahi depend for the irrigation of their rice and cane. The area under cane grown under the tank had to be reduced this year in consequence.

EXPERIMENTS.

SERIES A.—Area ·05 each plot.

To ascertain the variety of cane that will give the largest profit when grown under local conditions. The plots are to be manured for cane by folding thereon 7,000 sheep per acre for one night before planting, and by applying 150 maunds of sheep-manure or 15 maunds of cake as a top-dressing in the hot weather. The canes are grown in rotation with Cambodia cotton sown in rows 3′ apart.

Plot No.	Variety.	Number of canes per acre.	Weight of unstripped canes per acre.	Weight of stripped canes per acre.	Weight of juice per acre.	Weight of *gur* per acre.	Percentage of juice to cane.	Percentage of *gur* to juice.	Percentage of *gur* to cane.	Value realized per acre.	Cost of cultivation per acre.	Profit.	Percentage of red-rot.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
			lbs.	lbs.	lbs.	lbs.				Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	Khari ...	65,000	94,440	75,840	48,140	9,000	63·6	18·6	11·8	692 4 11	267 0 0	425 4 11	6
2	Kala (Local Red).	39,480	78,120	65,120	43,440	7,520	66·7	17·3	11·5	578 7 5	247 10 0	330 13 5	8
3	Red Mauritius.	32,000	52,240	41,040	27,800	5,100	67·7	18·3	12·4	332 4 11	248 14 0	143 6 11	4
4	Ashy ,, ...	25,000	67,080	54,680	37,480	7,540	68·5	20·1	13·7	580 0 0	278 14 0	301 2 0	12
5	Striped ,, ..	23,000	58,920	45,000	29,600	6,560	65·7	22·1	12·3	504 9 10	271 6 0	233 3 10	0
6	Pundia ...	21,520	61,040	48,040	33,720	5,480	70·1	16·2	11·4	421 8 7	264 8 0	157 0 7	68
7	Poundha ...	24,800	57,080	43,680	29,320	5,800	67·1	19·7	13·3	446 2 7	263 4 0	182 14 7	37
8	Lanji ..	34,240	35,780	25,140	17,600	3,540	70·00	20·1	14·08	272 4 11	199 8 0	72 12 11	7
9	Sunnabille ...	56,000	89,080	72,320	44,000	7,880	61·6	17·9	11·04	606 2 7	253 4 0	352 14 7	13
10	Katai ...	83,040	71,760	59,960	30,640	5,900	51·1	19·1	9·8	453 13 6	254 8 0	199 5 6	27

Khari, a variety obtained from Bengal and Sunnabille, a Bombay cane, have given the highest yields. Sunnabille has done very well in Chanda District and is gradually replacing Katai, the local thin cane which was widely sown till three years ago. Katai is a cane of poor quality but is hardy. The thick varieties were much damaged by stem-borer despite the fact that affected shoots were cut out at regular intervals; Pundia, Poundha and Katai were badly attacked by red-rot.

The analyses of these canes by the Agricultural Chemist is given in Appendix C to this report.

SERIES B.—Area ·05 each plot.

To ascertain the most profitable number of setts to plant per acre in the case of thick varieties. The plots are to be manured as in series A and cane is to be followed by Cambodia cotton grown in rows the same distance apart as the furrows for cane.

Plot No. 1 8,000 setts per acre in rows 4′ 8″ apart.
" 2 10,000 " 4′ "
" 5 12,000 " 3′ 8″ "
" 4 14,000 " 3′ "
" 5 16,000 " 2′ 6″ "
" 6 18,000 " 2′ "
" 7 20,000 " 1′ 6″ "

Plot No.	Number of canes per acre.	Weight of unstripped canes per acre.	Weight of stripped canes per acre.	Weight of juice per acre.	Weight of gur per acre.	Percentage of juice to cane.	Percentage of gur to juice.	Percentage of gur to cane.	Value realised per acre.	Cost of cultivation per acre.	Profit.
1	2	3	4	5	6	7	8	9	10	11	12
		lbs.	lbs.	lbs.	lbs.				Rs. a. p.	Rs. a. p.	Rs. a. p.
1	24,800	77,960	63,080	43,660	9,060	69·21	20·75	14·36	696 14 9	280 12 0	416 2 9
2	26,000	68,280	53,400	37,720	7,800	70·64	20·68	14·60	600 0 0	281 6 0	318 10
3	32,160	76,400	59,840	40,720	8,560	68·05	21·00	14·30	658 7 5	294 8 0	363 15 5
4	36,120	72,040	55,480	38,800	8,040	69·75	20·72	14·49	618 7 5	297 10 0	320 13 5
5	19,600	57,160	42,000	29,000	5,920	69·05	20·41	14·10	455 6 2	276 6 0	179 0 2
6	22,200	48,760	35,800	23,960	4,980	66·93	20·79	13·91	383 1 3	292 0 0	91 1 3
7	17,200	50,240	38,080	26,240	5,480	68·91	20·88	14·39	421 8 7	319 8 0	102 0 7

The number of setts planted in the villages surrounding the farm is from 16,000 to 20,000 per acre. In the experiment under review a seed rate of 8,000 setts per acre gave the highest outturn.

SERIES C.—Area ·05 each plot.

To ascertain the best time to plant thick cane. Cane is rotated with Cambodia cotton sown at different times.

Plot No.	Time of planting cane.		Time of sowing cotton.
1	1st October	...	15th May.
2	1st November	...	1st June.
3	1st December	...	After rains break.
4	1st January	...	15th May.
5	1st February	...	1st June.
6	1st March	...	After rains break.

Plot No.	Number of canes per acre.	Weight of unstripped canes per acre.	Weight of stripped canes per acre.	Weight of juice per acre.	Weight of *gur* per acre.	Percentage of juice to cane.	Percentage of *gur* to juice.	Percentage of *gur* to cane.	Value realized per acre.	Cost of cultivation per acre.	Profit.
1	2	3	4	5	6	7	8	9	10	11	12
		lbs.	lbs.	lbs.	lbs.				Rs. a. p.	Rs. a. p.	Rs. a. p.
1	38,800	127,560	107,000	79,680	12,280	74·50	15·41	11·5	944 9 9	322 10 0	621 15 9
2	27,000	97,960	83,200	61,760	8,940	74·23	14·47	10·7	687 11 0	295 2 0	392 9 0
3	30,040	88,680	67,600	50,340	7,410	74·6	14·7	10·9	570 0 0	287 10 0	282 6
4	28,080	95,640	79,240	53,550	7,460	67·5	13·9	9·4	573 13 6	288 14 0	284 15 6
5	26,080	74,880	61,680	44,420	6,340	72·0	14·27	10·2	487 11 0	278 14 0	208 13 0
6	12,560	57,120	43,040	30,600	4,360	71·1	14·24	10·1	335 6 2	258 4 0	77 2 2

Cane in the Central Provinces is ordinarily planted from January till the end of March. The results of this experiment would appear to indicate that cane planted in October gives a much larger yield than that planted in February and March, as practised locally. When planted in October, it gets a good start before the hot weather sets in and before the swarming of stem-borers takes place. This pest does nearly all its damage in these Provinces between February and June; but it does not to any appreciable extent attack cane which, when planted in October, is from 4'—5' high in February. The plots which were planted late, suffered also from red-rot to a greater degree than the October and November planted plots. If it is found that the planting season can be extended to the extent which this experiment would indicate to be possible, without reducing the yield, the information will be of considerable value in the management of the Sugar Estate and Factory which are being started in this district, for which a long working season is necessary. If by early planting we can prevent the damage done at present by borers and red-rot, the gain will be very great. At first sight it would appear that there is some connection between an attack of stem-borer and red-rot; but results obtained this year on the Tharsa Farm do not justify any such assumption.

SERIES E.—Area ·05 each plot.

To ascertain the most economical manure to apply to thick canes rotated with Cambodia cotton. Manure is applied in the year in which cane is grown.

Plot No. 1.—Folding 7,000 sheep for one night per acre before planting and a top dressing of 15 mds. of castor cake in May.
" 2.—As above with a top-dressing of 15 mds of til-cake per acre in May.
" 3.—As above with top-dressing of 150 mds. of sheep-dung per acre in May.
" 4.—600 mds. of cattle-dung per acre.
" 5.—400 mds. of cattle-dung and top-dressing of 200 mds. of cattle-dung in May.
" 6.—400 mds. of cattle-dung and top-dressing of 15 mds. of castor cake per acre in May.
" 7.—As above, but with a top-dressing of 15 mds. til-cake per acre in May.
" 8.—Cattle-dung as in plot 6, with a top-dressing of 7½ mds. of til-cake in March as the same quantity in June.

Plot No.	Number of canes per acre.	Weight of unstripped canes per acre.	Weight of stripped canes per acre.	Weight of juice per acre.	Weight of *gur* per acre.	Per-centage of juice to cane.	Per-centage of *gur* to juice.	Per-centage of *gur* to cane.	Value realized per acre.	Cost of cultivation per acre.	Profit.
1	2	3	4	5	6	7	8	9	10	11	12
		Lbs.	Lbs.	Lbs.	Lbs.				Rs. a. p.	Rs. a. p.	Rs. a. p.
1	17,200	36,960	30,480	21,520	3,780	70·60	17·57	12·40	290 12 4	235 7 0	55 5 4
2	25,000	45,360	36,560	26,080	4,660	71·38	17·87	12·74	358 7 5	237 5 0	121 2 5
3	21,360	28,320	19,760	15,500	3,200	78·54	20·65	16·20	246 2 6	205 12 0	40 6 6
4	29,000	55,120	48,480	33,260	6,920	68·61	20·81	14·27	532 4 11	234 8 0	297 12 11
5	30,000	44,720	39,640	26,320	5,380	66·40	20·44	13·57	413 13 6	221 4 0	190 9 6
6	26,000	52,540	46,620	31,580	6,840	67·74	21·66	14·67	526 2 6	255 7 0	270 11 6
7	23,000	55,250	49,260	36,120	7560	73·33	20·93	15·35	581 8 7	259 13 0	321 11 7
8	22,000	47,300	40,300	28,840	5840	71·56	20·25	14·47	449 3 3	248 9 0	200 10 8

This was the first year of the experiment and factors such as water-logging had to be reckoned with, which had not been taken into consideration when the plots were laid out. The poor outturn obtained from Plot III was entirely due to its having been water-logged during the rains.

SERIES G.—Area ·05 each plot.

To ascertain to what extent the cane-growers can economise by using top-shoots as opposed to setts from whole canes for planting. Cane is rotated with Rosea, Buri, Rosea cutchica and Cambodia cotton and is manured as in Series A.

Plot No. 1.—Setts from whole canes (Ashy Mauritius).
" 2.—Top-shoots from above.
" 1.—Setts from whole canes of Pundia.
" 2.—Top-shoots from Pundia.

Plot No.	Number of canes per acre.	Weight of unstripped canes per acre.	Weight of stripped canes per acre.	Weight of juice per acre.	Weight of *gur* per acre.	Per-centage of juice to cane.	Per-centage of *gur* to juice.	Per-centage of *gur* to cane.	Value realized per acre.	Cost of cultivation per acre.	Profit.
1	2	3	4	5	6	7	8	9	10	11	12
		Lbs.	Lbs.	Lbs.	Lbs.				Rs. a. p.	Rs. a. p.	Rs. a. p.
1	22,440	82,160	72,880	49,440	10,440	67·83	21·12	14·32	883 1 3	308 14 0	494 3 3
2	28,800	85,580	68,180	47,980	9,040	70·37	18·84	13·26	695 6 2	297 0 0	398 6 2
					Duplicate with *Pundia* cane.						
1	29,000	87,160	73,080	52,480	8,040	71·81	15·32	11·00	618 7 5	303 14 0	314 9 5
2	25,600	85,140	76,420	56,260	8,880	73·62	15·78	11·62	683 1 3	308 4 0	374 13 3

The outturns in weight of stripped cane and *gur* per acre obtained from Plot 1 of Ashy Mauritius contradict those of Plot 1 of Pundia in the duplicate series. No conclusive evidence can be drawn from one year's results. But if the use of top-shoots as opposed to setts from the whole cane does not increase the yield, it at least means a considerable economy in seed, as top-shoots are of relatively little value for *gur* containing as they do a very low percentage of sugar.

SERIES H.—Area ·05 each plot.

To compare the ridge-and-furrow system of cultivating thick canes as practised locally with the Madras and Java systems. Cane is rotated with Rosea, Rosea cutchica, Triumph and Cambodia and is manured as in Series A.

Plot 1.—Ridge and furrow.
" 2.—Java system.
" 3.—Madras system, drains 6' apart.
" 4.— " " 4' " .

Plot No.	Number of canes per acre.	Weight of unstripped canes per acre.	Weight of stripped canes per acre.	Weight of juice per acre.	Weight of *gur* per acre.	Percentage of juice to cane.	Percentage of *gur* to juice.	Percentage of *gur* to cane.	Value realized per acre.	Cost of cultivation per acre.	Profit.
1	2	3	4	5	6	7	8	9	10	11	12
		Lbs.	Lbs.	Lbs.	Lbs.				Rs. a. p.	Rs. a. p.	Rs. a. p.
1	85,000	1,01,760	81,240	56,060	10,880	67·01	19·41	13·39	636 14 9	312 0 0	324 14 9
2	20,840	81,880	66,520	43,000	9,100	64·64	21·16	13·67	700 0 0	298 4 0	401 12 0
3	24,100	62,240	49,960	33,400	6,800	65 85	20·36	13·61	523 1 3	272 10 0	250 7 3
4	23,680	58,600	46,320	31,360	6,540	67·41	20·85	14·06	503 1 3	270 2 0	232 15 3

The ridge-and-furrow system of Plot 1 as practised locally has proved to be the most profitable method of planting cane in this series.

SERIES J.—Area ·10 each plot.

To ascertain the most economical quantity of water to apply to thick and thin canes grown on *wardi* soil. Cane is rotated with Cambodia cotton and is planted on 1st February and is manured as in Series A.

For cane.	Plot No. I, irrigated.	Plot No. II, irrigated.	Plot No. III, irrigated.
January	Every 8th day.	Every 8th day.	Every 6th day.
February	" 9th "	" 8th "	" 6th "
March	" 8th "	" 7th "	" 5th "
April	" 8th "	" 6th "	" 5th "
May	" 8th "	" 6th "	" 5th "
June	" 8th "	" 6th "	" 5th "
October	" 14th "	" 14th "	" 14th "
November	" 14th "	" 14th "	" 14th "
December	" 14th "	" 14th "	" 14th "

Plot No.	No. of canes per acre.	Weight of unstripped canes per acre	Weight of stripped canes per acre.	Weight of juice per acre.	Weight of gur per acre.	Percentage of juice to cane.	Percentage of gur to juice.	Percentage of gur to cane.	Value realized per acre.	Cost of cultivation per acre.	Profit.	Loss.	Quantity of within cft. applied per acre.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
		Lbs.	Lbs.	Lbs.	Lbs.				Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	32,480	67,620	51,820	35,300	6,990	68·1	19·8	13·4	537 11 0	272 10 0	265 1 0	...	137746·4
2	28,000	59,420	55,100	37,460	7,510	68·0	20·05	13·6	577 11 0	282 10 0	295 1 0	...	162676·6
3	35,600	79,740	63,860	43,540	8,110	68·1	18·06	12·7	623 13 6	295 14 0	327 15 6	...	186861·8

The soil of this series is a sandy loam locally known as *wardi*, which requires water at frequent intervals. To Plot 3, which got the highest number of waterings, the quantity of water actually applied was 186,861·80 cubic feet. The outturn of this plot compared with the other two would appear to indicate that still more water could have been applied with advantage to the crop.

Cotton Varietal Series.

No. of plot.	Name of variety.	Time of sowing.	Number of irrigation given.		Outturn per acre.	Average value.
			Before rains.	After rains.		
					Lbs.	Rs. a. p.
1	Cambodia ...	Sown before rains ..	3	11	757·8	137 8 6
2	Rosea ...	Do. ..	3	11	1335·0	203 13 8
3	Buri ...	Do. ...	3	11	1,062·8	178 7 2
4	Nyassaland ..	Do. ...	...	11	2,47·8	Not valued.
5	Cambodia ...	Sown after ..	3	11	790·0	143 5 3
6	Roseum ...	Do. ...	3	11	1,020·0	154 11 4
7	Buri ...	Do. ...	3	11	790·0	132 8 7

Owing to the early cessation of the rains and to the absence of rain in the cold weather, cotton required more water than usual. In a normal year 6 to 7 waterings will suffice. Rosea, Buri and Cambodia were sent by Mr. Arno Schmidt to the Upper India Chamber of Commerce for valuation. Their report is given in Appendix A to this report. Samples were also sent to Sir Bezonji Dadabhoy, whose report is given in Appendix B.

Statement of expenditure from 1st July 1913 to 30th June 1914—Government Experimental Farm, Sindewahi.

Particulars.	Amount	Remarks.
	Rs. a. p.	
Purchase of seed grains	114 11 3	
Repairs to premises	...	
Postage	63 14 6	
Purchase of cattle and implements	1,817 11 0	
Repairs of tools	7 6 6	
Feed and care of cattle	1,594 4 4	
Variable labour	4,234 4 4	
Servants paid from contingencies	2,568 5 0	
Manure	995 2 1	
Country stationery	1 10 0	
Binding charges	17 0 0	
Earth works	181 1 6	
Repairs to roads and irrigation	607 4 0	
Packing and freight	523 4 3	
Miscellaneous	1,014 12 11	
Sugarcane plant	4,477 4 1	
Total ...	18,247 15 9	
Establishment.		
Salaries of establishment	2,961 3 9	
GRAND TOTAL ...	21,209 3 6	

Statement showing the receipts of the Sindewahi Farm for the year 1913-14.

	Rs. a. p.
Sale-proceeds of the farm produce ...	10,142 1 0
Land revenue on Government land ...	117 12 8
Forest receipts	82 6 3
Miscellaneous receipts	148 11 8
Total ...	10,490 15 7

Statement of seed supplied from 1st July 1913 to 30th June 1914 for sowing purposes.

Name of seed.	Quantity.	Remarks.
	Lbs.	
Gurmatia paddy ...	16,000	
Parewa Paddy ...	9,074	
Groundnut ...	1,164	
	No.	
Sugarcane ...	29,640	

D. CLOUSTON,

Deputy Director of Agriculture,

Southern Circle,

Central Provinces.

APPENDIX A.

Report by the Elgin Mills Company, Limited, Cawnpore, on samples of cotton submitted by Mr. Arno Schmidt, through the Upper India Chamber of Commerce, Cawnpore.

No. 1. *Cambodia from Chanda.*—This is no doubt a very fine cotton, and is one of the best, if not the best cotton, we have seen grown in India. As compared with American, it is equally as fine as regards diameter and the length of staple is $1\frac{1}{8}$ of an inch. It has, further, the good quality of not containing much short fibre. From a spinner's point of view, it is about 10 per cent better than the American cotton we import.

No. 2. *Rosea from Chanda.*—This is a useful cotton for our bazaar yarns. The mean length of staple is $\frac{7}{8}$ of an inch, but it is inferior to Kulpahar cotton both as regards length and fineness of staple. It is probably 5 per cent better than the ordinary run of fine Bengal.

No. 3 *Buri from Chanda.*—This is a cotton which we think it would pay to look after, as we think it might be still further improved. This is a most suitable cotton for counts from 24s warp to 36s weft. The mean length of staple is nearly $\frac{7}{8}$ of an inch, being equal to a good deal of the American cotton which we import; but it is scarcely as fine in diameter. It also contains more short fibre than Cambodia, which is a fault that should be avoided.

APPENDIX B.

With reference to my No. 1517 of 17th November, I beg to report regarding the six samples of cotton received from you as follows:—

(1) Irrigated Cambodia cotton. Good strong staple 7/8" to 1"; will spin up to 32s warp and 40s weft. Value Rs. 150 per Nagpur *boja* of 345 lbs. laid down at Nagpur.

(2) Non-irrigated Cambodia cotton. Good strong staple 1"; finer fibre than No. 1. Price Rs. 150 per *boja*. Percentage of lint may be less than No. 1.

(3) Irrigated Buri cotton as good as No. 2 in all respects. Value Rs. 150 per *boja*.

(4) Non-irrigated Buri cotton. Shorter staple than No. 3, but finer fibre; yield of lint perhaps less. Value Rs. 140 per *boja*.

(5) Irrigated Rosea cotton. Very short. Strong fibre, same as ordinary *jari*. Value Rs. 115 per *boja*.

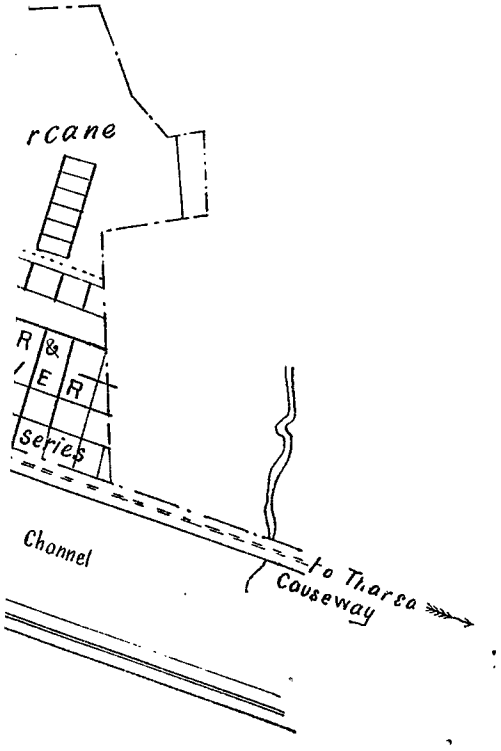
(6) Non-irrigated Rosea cotton. Better in staple than No. 5; strong. Value Rs. 117 per *boja*.

The season for long stapled cotton is not yet in full swing, and the prices given in (1) to (4) above must be considered as rough valuations only.

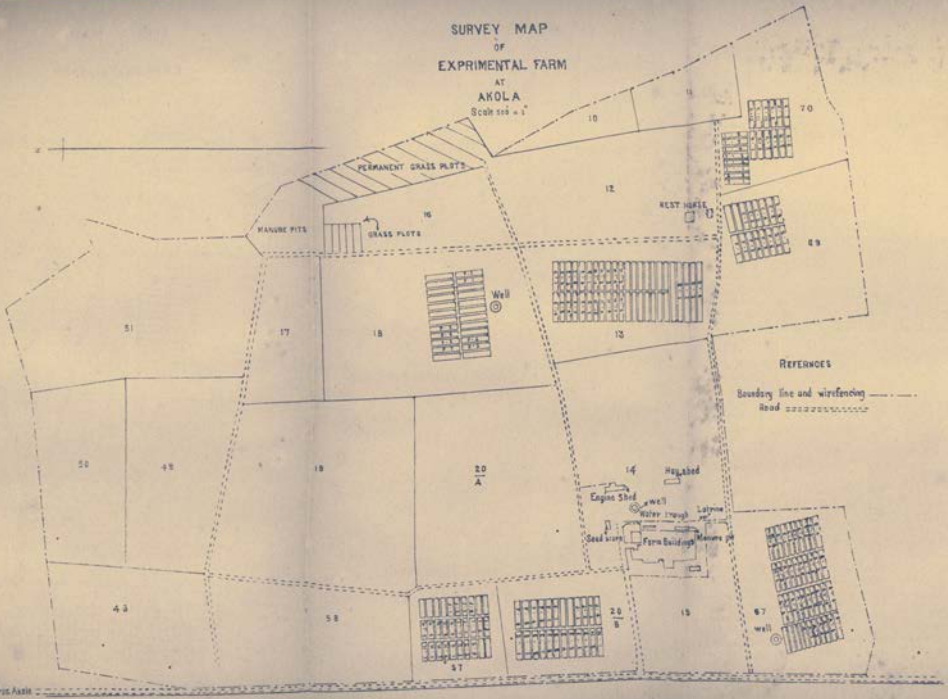
APPENDIX C.

Analyses of Sindewahi Canes, 1913-14.

Variety and date of planting.	Date of crushing.	Percentage of juice in stripped canes.	Corrected degrees Brix to 200 c.	Percentage of sucrose in juice.	Percentage of glucose in juice.	Coefficient of purity.
1. Khari, 19th January 1913...	6th Decr. 1913 ...	67·8	17·84	15·53	·78	86·8
	30th Decr. 1913 ...	60·8	19·92	17·57	·69	88·7
	24th Jany. 1914 ...	66·7	19·56	17·06	·42	90·6
	2nd March 1914...	70·4	20·24	18·19	·54	92·3
2. Kala, 19th January 1913 ...	6th Decr. 1913 ...	71·4	16·7	13·29	1·86	79·6
	30th Decr. 1913 ...	69·1	16·76	13·31	1·81	80·0
	24th Jany. 1914 ...	70·0	16·83	13·42	1·62	80·0
	2nd March 1914...	74·3	17·39	14·47	1·23	86·1
3. Red Mauritius, 19th January 1913.	6th Decr. 1913 ...	73·1	15·85	12·24	2·03	77·2
	31st Decr. 1913 ...	66·0	16·7	13·13	1·94	79·6
	25th Jany. 1914 ...	72·6	18·56	15·12	1·52	83·5
	2nd March 1914...	72·8	18·29	14·89	1·53	84·1
4. Ashy Mauritius, 19th January 1913.	6th Decr. 1913 ...	72·1	20·2	18·02	·80	89·2
	31st Decr. 1913 ...	71·6	20·52	18·67	·53	92·0
	25th Jany. 1914 ...	70·8	20·76	18·99	·38	93·5
	2nd March 1914...	72·2	20·74	19·16	·29	94·8
Bulk crushing of Ashy Mauritius, 19th January 1913.	31st Decr. 1913 ...	...	18·62	15·55	1·63	85·0
5. Stripped Mauritius, 19th January 1913.	6th Decr. 1913 ...	73·3	19·35	16·73	1·39	85·8
	31st Decr. 1913 ...	68·5	21·06	19·05	·54	91·6
	25th Jany. 1914 ...	70·8	21·06	19·09	·61	92·7
	2nd March 1914...	71·3	21·54	19·71	·23	93·9
6. Pundia, 19th January 1913.	6th Decr. 1913 ...	75·4	15·2	11·97	1·87	78·7
	31st Decr. 1913 ...	73·4	16·07	12·88	1·37	81·0
	25th Jany. 1914 ...	75·3	16·69	13·28	1·41	83·0
	3rd March 1914...	75·2	17·59	14·22	1·35	83·0
7. Pounda, 19th January 1913.	7th Decr. 1913 ...	73·4	19·3	17·22	·66	91·0
	31st Decr. 1913 ...	66·0	19·22	16·76	·90	87·7
	26th Jany. 1914 ...	72·8	20·51	18·31	·55	90·4
	3rd March 1914...	72·6	21·01	19·02	·47	93·2
8. Lanji, 19th January 1913 ...	7th Decr. 1913 ...	74·5	18·67	16·03	·90	87·3
	31st Decr. 1913 ...	66·1	19·69	17·74	·42	91·0
	26th Jany. 1914 ...	70·1	21·59	19·78	·33	92·4
	3rd March 1914 ...	71·2	21·01	19·67	·37	93·5
9. Sannabille, 19th January 1913.	7th Decr. 1913 ...	68·8	17·31	14·52	1·05	85·4
	31st Decr. 1913 ...	67·2	18·12	15·90	·63	88·3
	26th Jany 1914 ...	67·9	18·31	15·98	·62	88·5
	3rd March 1914...	66·2	19·51	17·22	·61	91·1
10. Katai, 19th January 1913...	7th Decr. 1913 ...	59·5	16·26	12·56	·59	78·7
	31st Decr. 1913 ...	52·6	18·4	15·07	·33	81·9
	26th Jany. 1914 ...	61·7	18·66	15·63	·36	84·9
	3rd March 1914...	59·1	18·31	14·27	·40	80·6


rcane
R
&
E
R
Series
Channel
to Tharsa
Causeway

SURVEY MAP
OF
EXPRIMENTAL FARM
AT
AKOLA
Scale 200 = 1"



P. W. D. Press Akola

Report on the Tharsa Agricultural Station for the year 1913-14.

This experimental station is one mile from Tharsa Station of the Bengal-Nagpur Railway. It was opened three years ago, with the object of solving certain agricultural problems which have arisen in connection with the demonstration work in the area commanded by the Ramtek Tank. The greater part of this area is cropped with wheat, linseed and *rabi juars*, none of which are irrigated. The area under rice is small, the varieties grown being mostly early ones which only require to be irrigated in years of short rainfall. Gurmatia, a late heavy yielding variety introduced by the Department, is being grown on a gradually increasing area year after year. The Department is also endeavouring to induce cultivators under this tank to grow sugarcane, groundnut and fruit. Cane and groundnut are therefore grown on the farm both for distribution and experimental purposes, and young orange seedlings are being raised for distribution.

2. Sugarcane grown on the farm on an area of 10 acres was again a very good crop. Outturns amounting to 43·86 tons of stripped cane and 5·01 tons of *gur* per acre were obtained. Almost the whole crop was crushed and made into *gur* by the Poona method.

The non-experimental area was manured by folding sheep on it: the sheep were fed by day on clover grown on the farm.

3. The analysis of the different varieties of cane by the Agricultural Chemist is given below :—

No.	Variety.	Date of planting.	Date of crushing.	Percentage of juice in stripped canes.	Degrees Brix apparent.	Degrees Brix corrected to 20°c.	Percentage of sucrose in juice.	Percentage of glucose in juice.	Co-efficient of purity.
1	2	3	4	5	6	7	8	9	10
1	Khari ...	1st January 1913.	19th November 1913.	72·3	15·6	15·97	12·42	1·21	79·6
			2nd December 1913.	72·9	15·85	16·36	13·09	·92	82·6
			18th December 1913.	68·1	17·3	17·54	14·62	·63	84·5
			5th January 1914.	68·7	17·6	18·05	15·48	·58	88·0
			19th January 1914.	70·1	17·0	17·48	14·55	·56	85·1
			3rd February 1914.	65·4	17·8	18·41	15·74	·51	88·4
			19th February 1914.	...	18·3	18·70	16·24	·41	88·7
			9th March 1914.	61·9	17·5	18·24	15·51	·46	88·6
2	Sannabille ..	1st January 1913.	17th November 1913.	65·4	13·95	14·26	10·55	1·66	75·7
			2nd December 1913.	73·4	14·3	14·81	11·55	1·19	80·8
			18th December 1913.	68·4	14·85	14·97	11·70	1·25	78·8
			5th January 1914.	70·2	15·6	16·04	13·18	·99	84·5
			19th January 1914.	68·5	15·4	15·77	12·85	·87	83·4
			3rd February 1914.	67·1	16·3	16·96	14·50	·57	88·9
			19th February 1914.	68·9	17·1	17·41	14·74	·70	86·2
			9th March 1914.	66·4	16·8	17·44	14·87	·59	88·5

No.	Variety.	Date of planting.	Date of crushing.	Percentage of juice in stripped canes.	Degrees Brix apparent.	Degree Brix corrected to 20°c.	Percentage of sucrose in juice.	Percentage of glucose in juice	Coefficient of purity.
1	2	3	4	5	6	7	8	9	10
			17th November 1913.	77·5	17·15	17·46	14·84	·876	88·2
			2nd December 1913.	77·4	17·6	18·06	15·96	·67	90·7
			18th December 1913.	72·6	19·15	19·09	17·43	·38	91·0
			5th January 1914.	75·6	18·9	19·44	17·56	·43	92·9
3	Lanji ...	1st January 1913.	19th January 1914.	72·2	20·2	20·88	19·08	·22	94·4
			3rd February 1914.	72·0	21·3	21·84	20·17	·18	94·7
			19th February 1914.	73·5	21·2	21·74	19·82	·25	93·5
			9th March 1914.	68·7	21·15	21·66	19·74	·29	93·3
			18th November 1913.	75·5	16·85	17·36	14·09	1·32	83·6
			2nd December 1913.	73·9	17·0	17·51	14·57	1·15	85·7
			18th December 1913.	69·3	17·5	17·5	14·76	·97	84·3
			5th January 1914.	...	17·8	17·99	15·53	·78	87·2
4	Pachrang ...	2nd January 1913.	19th January 1914.	73·1	16·95	17·54	14·90	·81	87·9
			3rd February 1914.	78·4	17·65	18·31	15·91	·71	90·1
			19th February 1914.	73·3	16·90	17·56	15·00	·75	88·7
			9th March 1914.	72·7	18·50	19·04	16·56	·64	89·5
			18th November 1913.	73·1	18·3	18·76	15·76	1·30	86·1
			2nd December 1913.	71·6	18·3	18·7	15·63	1·21	85·4
			18th December 1913.	71·4	18·6	18·66	15·92	·95	85·6
			5th January 1914.	70·8	19·1	19·36	16·74	·72	87·6
5	Kala ...	1st January 1913.	19th January 1914.	78·5	18·9	19·36	16·26	·97	86·0
			3rd February 1914.	65·5	19·2	19·88	17·22	·82	89·7
			19th February 1914.	71·5	19·5	20·04	17·26	·87	88·5
			9th March 1914.	69·0	19·35	20·09	17·79	·51	91·9

No.	Variety.	Date of planting.	Date of crushing.	Percentage of juice in stripped canes.	Degrees Brix apparent.	Degrees Brix corrected to 20°c.	Percentage sucrose of in juice.	Percentage of glucose in juice.	Coefficient of purity.
1	2	3	4	5	6	7	8	9	10
6	Pounda ...	2nd January 1913.	18th November 1913.	75·7	19·0	19·46	16·74	·88	88·1
			2nd December 1913.	76·1	21·42	...	18·51	·64	86·4
			18th December 1913.	72·3	20·85	20·79	18·63	·40	89·4
			5th January 1914.	71·8	21·85	22·17	20·41	·26	93·4
			19th January 1914.	73·2	20·8	21·41	19·16	·30	92·1
			3rd February 1914.	70·7	22·5	23·18	21·46	·18	95·3
			19th February 1914.	71·8	21·7	21·96	20·14	·26	92·8
			9th March 1914.	73·3	20·9	21·44	19·66	·25	94·1
7	Red Mauritius ...	1st January 1913.	18th November 1913.	77·9	15·7	15·94	12·29	1·91	78·2
			2nd December 1913.	77·3	15·6	16·19	12·88	1·69	82·6
			18th December 1913.	74·0	16·4	16·4	13·16	1·53	80·2
			5th January 1914.	83·2	18·0	18·4	15·48	1·18	86·0
			19th January 1914.	75·2	18·2	18·88	16·17	·95	88·8
			3rd February 1914.	71·4	18·85	19·53	16·98	·83	90·1
			15th February 1914.	74·9	19·20	19·52	16·76	·92	87·3
			9th March 1914.	74·3	18·75	19·36	16·61	·93	88·5
8	Pundia ...	1st January 1913.	18th November 1913.	79·8	12·25	12·61	8·31	2·83	67·8
			2nd December 1913.	80·0	12·2	12·76	8·24	2·68	67·5
			18th December 1913.	76·8	13·95	14·12	10·09	2·15	72·3
			5th January 1914.	77·5	13·95	14·46	10·74	1·87	76·9
			19th January 1914.	79·7	15·7	16·14	12·99	1·49	82·7
			3rd February 1914.	76·1	15·4	15·91	12·75	1·57	82·8
			19th February 1914.	73·5	17·4	17·71	14·54	1·41	83·5
			9th March 1914.	77·9	17·3	17·81	14·76	1·21	85·3

No.	Variety.	Date of planting.	Date of crushing.	Percentage of juice in stripped canes.	Degrees Brix apparent.	Degrees Brix corrected to 20°c.	Percentage of sucrose in juice.	Percentage of glucose in juice.	Co-efficient of purity.
1	2	3	4	5	6	7	8	9	10
			18th November 1913.	75·9	17·20	17·64	15·18	1·37	88·2
			2nd December 1913.	75·4	18·3	18·70	16·24	1·30	88·7
			18th December 1913.	73·7	19·4	19·34	17·50	·72	90·2
			5th January 1914.	72·9	18·8	19·34	17·40	·65	92·6
9	Ashy Mauritius ...	2nd January 1913.	19th January 1914.	73·5	19·5	20·04	18·48	·37	94·8
			3rd February 1914.	68·0	18·8	19·41	17·35	·63	92·2
			10th February 1914.	81·8	18·8	19·48	17·83	·54	94·8
			9th March 1914.	74·2	20·5	20·90	19·41	·28	94·7
			18th November 1913.	73·5	18·95	19·41	16·79	·98	88·6
			2nd December 1913.	73·3	19·40	20·01	17·66	·70	91·0
			18th December 1913.	70·9	19·80	19·92	17·80	·44	90·0
			5th January 1914.	71·5	19·20	19·52	17·43	·49	90·8
10	Stripped Mauritius.	2nd January 1913.	19th January 1914.	71·5	19·35	19·96	18·08	·28	93·4
			3rd February 1914.	70·0	19·30	19·84	17·85	·41	92·5
			19th Ferusry 1914.	71·0	20·50	20·82	19·28	·23	94·1
			9th March 1914.	72·3	19·00	19·61	17·70	·22	93·2
			18th November 1913.	72·2	16·2	16·64	13·01	1·53	80·3
			2nd December 1913.	72·0	16·35	16·86	13·45	1·33	82·3
			18th December 1913.	69·6	16·80	16·92	13·75	1·06	81·8
			5th January 1914.	68·7	17·45	17·96	14·89	·80	85·3
11	Green Tana ...	1st January 1913.	19th January 1914.	67·5	17·60	18·05	14·77	·63	83·9
			3rd February 1914.	69·2	16·90	17·64	14·55	·86	86·1
			19th February 1914.	69·4	18·30	18·84	15·63	·58	85·4
			9th March 1914.	68·7	18·10	18·56	15·31	·51	84·5

No.	Variety.	Date of planting.	Date of crushing.	Percentage of juice in stripped canes.	Degrees Brix apparent.	Degrees Brix corrected to 20°c.	Percentage of sucrose in juice.	Percentage of glucose in juice.	Co-efficient of purity.
1	2	3	4	5	6	7	8	9	10
12	Striped Tana ...	28th January 1913.	18th November 1913.	72·9	15·95	16·32	12·56	2·25	78·7
			2nd December 1913.	73·2	17·00	17·51	13·98	1·64	82·2
			18th December 1913.	70·8	17·95	18·14	14·73	1·20	82·1
			5th January 1914.	70·6	17·75	18·29	15·32	1·07	86·3
			19th January 1914.	71·5	18·0	18·61	15·48	·98	86·0
			3rd February 1914.	67·7	19·0	19·61	16·84	·76	88·6
			19th February 1914.	68·9	19·2	19·66	16·95	·72	88·3
			9th March 1914.	69·1	18·9	19·51	16·58	·62	87·7

4. The area of the farm is 57·18 acres, of which 49 acres are under cultivation. The soil is *morand II*, a second class black cotton soil. It is a light soil of its class and many of the fields had previous to its acquisition suffered badly from scouring. Its chemical analysis by the Agricultural Chemist is given below :—

	Tharsa No. 3, sugarcane experiment Plot No. 57.	Tharsa No. 4, wheat experiment Plot No. 110.
Stones; above 3 m. m. ...	...	...
Fine gravel; 3 to 1 m. m. ...	4·76	4·28
	In 100 gm. of fine soil.	
Coarse sand; 1 to 2 m. m. ...	16·45	16·39
Fine sand; ·2 to ·04 m. m. ...	11·53	10·72
Silt; ·04 to ·01 m. m. ...	13·66	12·60
Fine silt; ·01 to ·002 m. m. ...	15·76	20·70
Clay; below ·002 m. m. ...	34·79	31·55
Calcium carbonate ...	1·18	1·45
Phosphoric acid P^2O^5 ...	·032	·023
Potash K^2O ...	·261	·270
Nitrogen ...	·048	·034

5. The whole area has now been levelled and the *kans* grass which overran most of the fields has been cleaned out. The levelling process was facilitated by the construction of stone *bunds* across nallas to prevent scouring.

6. Groundnut did very well on the farm, but much damage was done to the crop by jackals and crows. The average outturn over an area of 3·60 acres was 1,200 lbs. per acre.

7. Paddy again gave a very low yield; the soil is too light and coarse-grained for rice. In future a small experimental area only will be sown with this crop.

8. Cambodia cotton yielded 260 lbs. of *kapas* per acre and Buri 307 lbs., very poor outturns for irrigated cottons. Rosea is being tried in the current year.

9. Sunflower was grown in 0·35 of an acre and gave 177 lbs. of seed, *i. e.*, 506 lbs. per acre.

10. The trees in the fruit garden are thriving very well. One dozen seedless orange trees were added to the garden during the year. The manurial experiments with orange and mango trees is being continued: no results will be published till the trees all bear fruit.

11. The farm buildings constructed by the Irrigation Department have proved unsatisfactory; the walls have fallen in many places, and the repair of the roofs have already demanded much attention.

12. The farm was inspected during the year by the Hon'ble the Chief Commissioner.

The Superintendent, Lal Mohammed, has again shown rare tact and ability as a manager. He carried out the experimental work, too, in a very creditable manner.

Character of the season.

The rainfall for the year was only 38 inches, which was 11 inches less than in the previous year: from the middle of September till the middle of February it amounted to only 2·28 inches; wheat was in consequence more responsive than usual to irrigation and cane required two or three extra waterings. The short rainfall and dry sun-shine of September was detrimental to the growth of rice. The young transplanted seedlings, though regularly irrigated, made little progress and the crop gave a very poor yield.

Statement showing the rainfall of the year 1913-14.

Month.	Number of rainy days.	Rainfall.	
		Inches.	Cents.
1	2	3	4
June ... { 1st half ...	5	1	14
{ 2nd " ...	9	10	16
July ... { 1st " ...	7	2	90
{ 2nd " ...	9	5	87
August ... { 1st " ...	5	7	57
{ 2nd " ...	5	3	16
September ... { 1st " ...	3	2	14
{ 2nd " ...	1	...	34
October ... { 1st " ...	1	1	2
{ 2nd " ...	...	...	...
November ... { 1st " ...	...	...	...
{ 2nd " ...	...	...	...
December ... { 1st " ...	2	...	92
{ 2nd " ...	...	...	...
January ... { 1st " ...	...	...	...
{ 2nd " ...	...	...	...
February ... { 1st " ...	...	...	...
{ 2nd " ...	3	...	25
March ... { 1st " ...	2	...	86
{ 2nd " ...	1	...	11
April ... { 1st " ...	5	2	42
{ 2nd " ...	...	...	...
May ... { 1st " ...	...	...	...
{ 2nd " ...	...	...	...
Total ..	58	38	86

EXPERIMENTS.

SERIES A.—SUBJECT.—To ascertain the variety of cane that will give the largest profit, the plots are to be manured for cane with 400 maunds of cattle-dung before planting and 200 maunds of cattle-dung or 15 maunds of cake as a top-dressing in the hot weather. The canes are to be grown in rotation with groundnuts :—

Varietiy.	Number of stripped canes per acre.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of juice per acre in lbs.	Weight of *gur* per acre in lbs.	Percentage of juice to cane.	Percentage of *gur* to juice.	Percentage of red-rot.	Average weight of canes in lbs.	Value of *gur* at 25 lbs. per rupee.
1	2	3	4	5	6	7	8	9	10	11
										Rs. a. p.
1. Khari ...	82,000	124,320	89,160	59,880	9,680	67·16	16·17	9	1·09	645 5 0
2. Sannabille ...	74,640	128,200	92,800	61,600	10,440	66·38	16·95	20	1·24	696 0 0
3. Lanji ...	52,160	89,240	61,400	44,120	9,220	71·86	20·90	3	1·18	614 11 0
4. Red Mauritius ...	37,360	115,720	90,400	65,880	10,960	72·87	16·64	7	2·42	730 11 0
5. Pundia ...	23,000	84,080	66,760	51,120	8,430	76·57	16·49	92	2·90	562 0 0
6. Ashy Mauritius ...	50,600	106,680	84,040	60,680	10,840	72 20	17·86	21	2·75	722 11 0

Of the varieties under trial Red Mauritius gave the largest yield in the year under report, the outturn of stripped cane and *gur* being 40·36 and 4·89 tons per acre respectively. It is a cane which is very subject to attack by stem-borer and wilts readily in the hot weather if not regularly irrigated.

Pundia gave the highest percentage of juice to cane, but is very subject to red-rot and requires much water. Lanji is a very high quality cane which gives first class *gur*, but it is a delicate variety and does not yield well. Sannabille, a thin variety with a hard rind, is perhaps the most suitable variety for the tract, being hardy and a very good ratooner. It gives very good *gur* too. Ashy Mauritius is one of the very best thick canes under trial.

SERIES B.—SUBJECT.—To ascertain the most profitable number of setts to plant per acre in the case of thin varieties. The plots are manured as in Series A and cane is followed by chillies :—

Number of setts.	Number of canes per acre.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of juice per acre in lbs	Weight of gur per acre in lbs.	Percentage of juice to cane.	Percentage of gur to juice.
1	2	3	4	5	6	7	8
Plot I.— 8,000 setts per acre ..	71,040	109,240	89,520	59,680	10,300	66·67	17·26
,, II.—10,000 ,, ..	72,000	114,200	92,520	60,600	10,320	65·50	17·03
,, III.—12,000 ,, ..	72,640	114,920	93,480	62,000	10,390	66·32	16·76
,, IV.—14,000 ,, ...	75,600	118,760	95,880	64,000	10,860	66·75	16·97
,, V.—16,000 ,, ...	78,000	130,560	98,240	66,840	11,220	68·04	16·79
,, VI.—18,000 ,, ..	71,880	111,640	88,160	59,880	10,380	67·92	17·33
,, VII.—20,000 ,, ..	72,000	110,050	87,080	56,840	10,580	65·27	18·61

The variety of cane grown was *sannabille*, a thin hard variety : 16,000 setts. corresponding to about 2,000 whole canes, has given the highest yield ; but the difference in yield obtained from plot No. 1 planted with 8,000 setts and plot No. VII planted with 20,000 is very small indeed. With the smaller seed-rate the crop tillered much better.

SERIES D.—SUBJECT.—To ascertain the best rotation for thin canes manured as in Series A:—

	1st year.	2nd year.	3rd year.
Plot	I.—Cane	Cane (ratoon).	Groundnut.
,,	II.— ,,	Groundnut.	*Juar.*
,,	III.— ,,	Wheat.	Linseed.
,,	IV.— ,,	Groundnut and wheat.	Cotton.
,,	V.— ,,	Chillies.	Chillies.
,,	VI.— ,,	Rice.	Rice.

Plot No.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of *gur* per acre in lbs.
1	2	3	4
1	115,800	89,840	9,540
2	116,520	89,480	10,060
3	125,680	93,560	9,960
4	113,200	88,200	8,840
5	109,160	87,600	9,610
6	110,120	88,560	8,940

These outturns are fairly uniform: they vary from 39·11 tons to 41·77 tons of stripped cane and from 3·95 tons to 4·49 tons of gur per acre.

SERIES D.—SUBJECT.—To ascertain the best rotation for thin canes manured as in Series A:—

	1st year.	2nd year.	3rd year.
Plot	I.—Cane	Cane (ratoon).	Groundnut.
,,	II.— ,,	Groundnut.	*Juar.*
,,	III.— ,,	Wheat.	Linseed.
,,	IV.— ,,	Groundnut and wheat.	Cotton.
,,	V.— ,,	Chillies.	Chillies.
,,	VI.— ,,	Rice.	Rice.

Plot No.	1912-13 (1st year).			1913-14 (2nd year).				
	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of *gur* per acre in lbs.	Weight of unstripped ratoon canes per acre in lbs.	Weight of stripped ratoon canes per acre in lbs.	Weight of *gur* per acre in lbs.	Weight of rain, groundnut and chillies.	Weight of straw per acre in lbs.
1	2	3	4	5	6	7	8	9
1	82,035	65,215	7,120	20,585	13,050	1,270	...	...
2	84,500	64,490	7,395	...	...	...	1,410 Groundnut.	2,910
3	88,155	67,380	6,425	...	...	..	780 Wheat.	780
4	81,230	60,300	6,525	...	...	...	1,730 Groundnut.	3,620
							343 Wheat.	357
5	80,555	53,255	6,045	...	...	...	47 Chillies.	...
6	78,665	58,300	6,915	...	...	...	223 Rice.	967

This is the duplicate of the last series of rotation experiments: the second crop of each rotation was grown in the year under report.

Without manure ratoon cane in Plot No. 1 did not do well. Groundnut and wheat after cane were good crops. Chillies and rice did poorly: for the latter crop the black soil of the farm is not at all suited. The poorness of the crop of chillies was due to the want of manure, the land being manured once only in three years, *i. e.*, in the year in which cane is grown.

SERIES E.—SUBJECT.—To ascertain the most economical manure to apply to cane rotated with groundnut. The manure is applied in the year in which cane is grown :—

PLOT I.—600 maunds cattle-dung.

" II.—400 do. + a top-dressing of 200 maunds cattle-dung.

" III.—400 do. + do. 15 do. castor-cake.

" IV.—400 do. + do. 15 do. *til*-cake.

" V.—400 do. + do. 15 do. *til*-cake half applied in March and half in June.

" VI.—400 do. + do. 15 do. *khardi*-cake.

" VII.—400 do. + do. 2 do. refined saltpetre.

" VIII.—400 do. + do. 2 do. sulphate of ammonia.

" IX.— 14 maunds *til*-cake and 14 maunds top-dressing.

Plot No.	Number of canes per acre.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of juice per acre in lbs.	Weight of *gur* per acre in lbs.	Percentage of juice to cane.	Percentage of *gur* to juice.	Cost of cultivation, including manure and irrigation.	Value of outturn at 15 lbs. per rupee.	Net profit.
1	2	3	4	5	6	7	8	9	10	11
								Rs. a.	Rs. a.	Rs. a.
1 ...	60,600	50,520	34,120	21,880	4,000	64·13	18·28	235 0	266 11	31 11
2 ...	59,600	49,880	35,960	21,980	4,200	61·12	19·11	235 8	280 0	44 8
3 ...	60,960	80,160	56,880	36,840	7,340	64·77	19·92	351 11	489 5	137 10
4 ...	60,560	81,360	61,720	39,600	7,900	64·16	19·95	309 13	526 11	216 14
5 ...	73,440	89,360	66,920	43,800	8,400	65·45	19·18	326 1	560 0	233 15
6 ...	58,160	63,360	45,840	29,880	6,060	65·18	20·28	329 3	404 0	74 13
7 ...	40,520	39,760	26,240	16,800	2,810	64·02	16·73	214 13	187 5	27 8
8 ...	50,200	56,560	40,280	25,640	4,910	63·65	19·15	260 12	327 5	66 9
9 ...	52,600	62,480	45,240	28,680	5,290	63·40	18·44	257 8	352 11	95 3

Cattle-dung applied at the rate of 400 maunds per acre followed by two top-dressings each of $7\frac{1}{2}$ maunds *til* cake has given the highest profit. The saltpetre was put on in July, but had but little effect on the crop, due most probably to the fact that there was a heavy down-pour of rain just after it was applied.

SERIES F.—SUBJECT.—To ascertain the most profitable quantity of cattle-dung in terms of nitrogen to apply to cane, ⅔rds being applied before planting and ⅓rd as a top-dressing in May. Cane to be rotated with *juar* sown on 1st March :—

Approximate quantity of nitrogen applied per acre.	Number of canes per acre.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of juice per acre in lbs.	Weight of *gur* per acre in lbs.	Percentage of juice to cane.	Percentage of *gur* to juice.	Cost of cultivation, including manure and irrigation.	Value of outturn at 15 lbs. per rupee.	Net profit.
1	2	3	4	5	6	7	8	9	10	11
								Rs. a.	Rs. a.	Rs. a.
I.—300 maunds cattledung= 150 lbs. nitrogen.	46,000	48,440	32,520	21,320	4,120	65·56	19·32	199 3	274 11	75 8
II.—400 maunds cattle-dung= 200 lbs. nitrogen.	47,000	60,400	43,720	28,460	5,520	65·10	19·40	229 8	368 0	138 8
III.—500 maunds cattle-dung= 250 lbs. nitrogen.	61,280	78,080	55,240	35,800	6,950	64·81	19·41	265 2	463 5	198 3
IV.—600 maunds cattle-dung= 300 lbs. nitrogen.	66,000	95,120	73,520	47,280	8,640	64·31	18·27	301 9	576 0	274 7
V.—700 maunds cattle-dung= 350 lbs. nitrogen.	65,600	108,040	74,760	47,840	8,700	63·99	18·19	314 3	580 0	265 13

In cane cultivation on black soil it pays to manure heavily. As we increase the quantity of cattle-dung applied from 300 maunds supplying about 150 lbs. of nitrogen, to 600 maunds supplying 300 lbs. of nitrogen per acre, we increase the net profit on the cultivation by Rs. 199. The manure given in excess of 600 maunds was applied at a loss.

SERIES G.—SUBJECT.—To ascertain to what extent the cane-grower can economise by using top-shoots only for planting. Cane is rotated with *juar* sown on 1st April and is manured as in Series A :—

Whole cane setts and top-shoots.	Number of canes per acre.	Weight of unstripped canes per acre.	Weight of stripped canes per acre.	Weight of juice per acre.	Weight of *gur* per acre.	Percentage of juice to cane.	Percentage of *gur* to juice.
1	2	3	4	5	6	7	8
		lbs.	lbs.	lbs.	lbs.		
I.—Setts from whole Ashy Mauritius cane.	29,320	84,040	67,680	47,400	8,260	70·04	17·43
II.—Top-shoots from Ashy Mauritius.	28,120	81,640	70,320	49,440	8,720	70·31	17·64
III.—Setts from whole Sannabille.	68,600	131,960	96,246	63,720	10,100	66 21	15·85
IV.—Top-shoots from Sannabille.	73,480	121,000	89 040	59,080	10.380	66 31	17·57

Top-shoots, both in the case of the thick and the thin varieties under trial yielded more *gur* than setts from the rest of the cane. The canes produced by top-shoots gave a slightly richer juice in both cases. While the gain in yield from the use of top-shoots is insignificant, the saving in seed is very considerable.

SERIES H.—SUBJECT.—To compare the ridge-and-furrow system of cultivating thin cane, as practised locally, with the Madras (bed-and-furrow) system and the Java drainage system. Cane is rotated with *juar* sown on 1st May and the plots are manured as in Series A :—

Method of planting.	Number of canes per acre.	Weight of unstripped canes per acre.	Weight of stripped canes per acre.	Weight of juice per acre.	Weight of *gur* per acre.	Percentage of juice to canes.	Percentage of *gur* to juice.
1	2	3	4	5	6	7	8
		lbs.	lbs.	lbs.	lbs.		
I.—Ridge-and-furrow system ...	83,240	133,640	103,560	68,160	10,000	65·82	14·67
II.—Madras system ...	56,000	101,960	70,960	50,120	8,120	70·63	16·20
III.—Java system ...	65,560	99,440	70,000	45,960	8,040	65·66	17·49

The ridge-and-furrow method of planting has given the best results.

SERIES J.—SUBJECT.—To ascertain the most economical quantity of water to apply to cane grown on black soil. Cane is rotated with *juar* sown in July, is planted on 1st February, and is manured as in Series A :—

	Plot I irrigated.	Plot II irrigated.	Plot III irrigated.
In January ...	Every 9th day	Every 8th day	Every 6th day
,, February ...	,, 9th ,,	,, 8th ,,	,, 6th ,,
,, March ...	,, 8th ,,	,, 7th ,,	,, 5th ,,
,, April ...	,, 8th ,,	,, 6th ,,	,, 5th ,,
,, May ...	,, 8th ,,	,, 6th ,,	,, 5th ,,
,, June ...	,, 8th ,,	,, 6th ,,	,, 5th ,,
,, October ...	,, 14th ,,	,, 14th ,,	,, 14th ,,
,, November ...	,, 14th ,,	,, 14th ,,	,, 14th ,,
,, December ...	,, 14th ,,	,, 14th ,,	,, 14th ,,

Plot No.	Number of canes per acre.	Weight of unstripped canes per acre in lbs.	Weight of stripped canes per acre in lbs.	Weight of juice per acre in lbs.	Weight of *gur* per acre in lbs.	Percentage of juice to cane.	Percentage of *gur* to juice.
1	2	3	4	5	6	7	8
1	60,020	88,040	63,480	42,000	8,740	66·16	20·81
2	61,760	109,760	82,520	55,240	8,960	66·94	16·22
3	63,880	117,600	90,520	59,440	10,280	65·66	17·29

Forty waterings were given to Plot III, 33 to Plot II and 28 to Plot I. The average amount of water actually applied to the land at each irrigation was approximately $1\frac{3}{4}$", or 6,352 cubic feet per acre. So the total quantity applied per acre in each case was about 254,080 cubic feet, 209,616 cubic feet and 177,856 cubic feet respectively. Owing to the early cessation of the monsoon it was necessary to give one watering in September.

SERIES K.—SUBJECT.—To ascertain the immunity of different varieties of cane under trial, to red-rot and damage from stem-borer. The observation to be made on plant and ratoon cane grown in Series A :—

Variety.	Percentage of canes affected with red-rot.	Canes affected with borer and uprooted on						Ratoon canes affected with borer and uprooted on			
		3rd March 1913.	1st May 1913.	1st June 1913.	10th June 1913.	23rd June 1913.	Total.	3rd June 1913.	11th June 1913.	24th June 1913.	Total.
1	2	3	4	5	6	7	8	9	10	11	12
I.—Khari ...	9	92	127	84	45	145	493	168	68	58	294
II.—Sannabille ...	20	12	125	113	62	175	487	292	133	121	546
III.—Lanji ...	3	28	427	220	132	190	597	305	485	514	1,304
IV.—Pachrang ...	7	26	46	172	80	150	474	121	237	119	477
V.—Kaha ...	11	20	208	72	45	68	413	100	100	110	310
VI.—Poundha ...	12	8	115	135	34	168	460	161	122	110	393
VII.—Red Mauritius ...	7	110	265	200	42	150	767	461	590	600	1,651
VIII.—Pundia ...	92	40	76	84	40	50	290	116	145	150	411
IX.—Ashy Mauritius ...	21	37	68	34	16	64	219	34	100	110	244
X.—Stripped Mauritius ...	14	26	40	52	22	55	195	50	34	38	122
XI.—Green Tana ...	4	12	68	45	30	40	195	...	...	...	...
XII.—Stripped Tana ...	8	*Nil.*	100	172	60	150	482	...	...	...	...

Pundia is by far the most liable to red-rot. Red Mauritius and Lanji suffered much from stem-borer, but very little from red-rot. It would appear therefore that a cane which has been damaged by the borer is not on that account more subject to red-rot, but this point requires further investigation.

SERIES M.—SUBJECT.—To compare the manurial values of cattle-dung, bone-meal, *san* hemp and wild *Sawri* (Sesbania aculeata) as manures for rice.

Plot I.—Wild *Sawri* ploughed in *plus* two maunds bone-meal per acre.
" II.—Two maunds bone-meal per acre.
" III.—Mahua refuse 2 tons "
" IV.— *Nil.*
" V.—Cattle-dung 2 tons "
" VI.—Bone-meal 4 maunds "
" VII.—Sann hemp ploughed in "
" VIII.—Wild *Sawri* " "

Plot No	Outturn in lbs. per acre.					Profit or loss due to manure.	
	Grain.	Straw.	Value of outturn.	Value of increase.	Cost of manure.	Profit.	Loss.
1	2	3	4	5	6	7	8
	lbs.	lbs.	Rs. a.	Rs. a.	Rs. a.	Rs. a.	Rs. a.
1	145	465	6 1	3 1	13 0	...	9 15
2	77	283	3 6	0 6	8 0	...	7 10
3	143	267	5 3	2 3	9 10	...	7 7
4	70	235	3 0	...	...	...	...
5	670	730	22 3	19 3	5 0	14 3	...
6	410	430	13 8	10 8	16 0	...	5 8
7	260	340	8 14	14 5	6 0	...	0 2
8	255	335	8 11	5 11	5 0	0 11	...

The outturns of rice are so low in all the plots, that no conclusive deductions can be drawn from this series. The soil is distinctly unsuited for this cereal.

SERIES T-1.—SUBJECT.—To ascertain the heaviest yielding variety of 18 wheats grown under irrigation :—

Plot 0·10 acre.

Name of variety.	Outturn per acre in lbs.					
	Average for three years, including 1913-14.		For 1913-14.			
	Grain.	Straw.	Grain.	Straw.	Valuation by Ralli Brothers per cwt.	Value of outturn.
1	2	3	4	5	6	7
	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1. Pusa No. 4 ...	550	770	300	560	5 8 0	14 12 0
2. „ No. 6-A ...	404	559	153	227	5 9 3	7 10 0
3. „ No. 7 ...	...	...	803	867	5 8 0	39 7 0
4. „ No. 8 ...	503	810	315	555	5 10 0	15 13 0
5. „ No. 12 ...	782	920	530	640	5 10 0	26 10 0
6. „ No. 107 ...	583	815	243	357	5 8 0	11 15 0
7. „ No. 108 ...	550	873	150	280	5 7 0	7 5 0
8. Hard *pissi* ...	634	826	345	465	5 6 0	16 9 0
9. Hansi ...	379	541	105	225	6 0 0	5 10 0
10. *Mundi pissi* ...	670	838	650	745	5 7 0	31 9 0
11. *Hansi* „ ...	636	764	773	827	5 9 0	38 6 0
12. *Bansi* ...	279	614	250	410	6 2 0	13 11 0
13. *Tigharia* ...	254	376	50	190	5 6 0	2 6 0
14. *Sikurhai pissi* ...	761	1,134	605	800	5 10 0	30 6 0
15. Poona-Nagpur-Mazaffernagar ...	706	993	543	653	5 10 0	27 4 0
16. Poona-Hansia and Broach ...	310	613	30	110	5 2 0	1 6 0
17. Lalkesarwali chatti ...	605	977	345	610	5 4 0	16 3 0
18. Poona-Australian No. $22\frac{a}{33}$ ...	574	907	357	467	5 8 0	17 9 0

Pusa No. 7 gave the largest yield; while Hansi stands second. The outturns were all low, due, it is believed, to the effect of the *san* hemp ploughed in as a green manure every year.

SERIES U.—SUBJECT.—To find out the best rotation for irrigated wheat :—

Plot I.—Groundnut sown before rains and followed by wheat.

„ II.—Soy-bean followed by wheat.

„ III.—Groundnut sown at usual time followed by wheat.

„ IV.—Wheat alone.

Plot 0·10 acre.

Plot No.	Outturn per acre in lbs.					Value of both crops.	Cost of cultivation.	Net profit.	Loss.
	Average for two years 1912-13 and 1913-14.		For 1913-14.						
	Grain.	Straw.	Grain.	Straw.	Value.				
1	2	3	4	5	6	7	8	9	10
	lbs.	lbs.	lbs.	lbs.	Rs. a.	Rs. a.	Rs. a.	Rs. a.	Rs.
1 Groundnut ...	1,920	3,830	1,620	3,160	107 9	150 4	40 5	109 15	...
1 Wheat ...	629	700	857	903	42 11				
2 Soy-bean ...	550	1,035	110	160	4 6	51 4	13 10	37 10	...
2 Wheat ...	536	643	943	967	46 14				
3 Groundnut ...	1,410	3,960	520	3,090	38 8	57 7	23 4	34 3	...
3 Wheat ...	283	252	375	445	18 15				
4 Wheat ...	1,031	1,108	877	907	43 10	43 10	10 12	32 14	

The plot on which groundnut, sown before the rains, was followed by wheat as a second crop has given by far the largest net profit. The groundnut of Plot No. III was badly damaged by jackals which accounts for the low yield of groundnut. Soy-bean cannot be grown profitably in these Provinces.

SERIES X-II.—SUBJECT.—To ascertain the most economical number of waterings for wheat manured with one ton cattle-dung per acre.

Plot 0·10 acre.

Number of waterings.	Outturn per acre in lbs.		
	Grain.	Straw.	Value.
1	2	3	4
	lbs.	lbs.	Rs. a.
4	646	703	32 5
3	663	616	32 13
2	637	605	31 7
1	615	607	30 7
None	545	630	27 6

The rainfall during the period of growth of this crop amounted to 92 per cent only, which is below the average. Owing to the early cessation of the rains, moreover, there was not much surface moisture in the soil at the time of sowing: there was a slight advantage gained in the year under report, therefore, by giving more than one watering. From the data available at present it would appear that, after a normal monsoon and a rainfall of at least $1\frac{1}{4}''$ during the growing period of the crop, *haura* wheat gives its highest outturn with one irrigation. With a cold weather rainfall of less than $1\frac{1}{4}''$, two irrigations are beneficial; but except in years in which a poor monsoon is followed by a short cold weather rainfall more than two irrigations are never required.

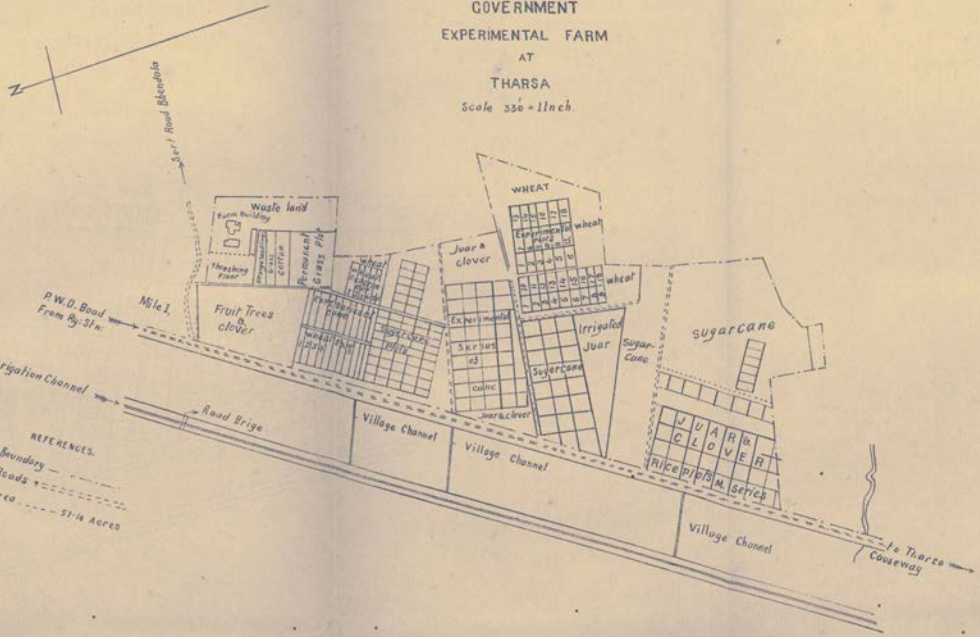
Statement of Receipt and Expenditure of Tharsa Farm during the year 1913-14 *from 1st July to 30th June.*

Particulars.	Amount.		
	Rs.	a.	p.
RECEIPT.			
Sale-proceeds credited into the treasury	4,941	11	8
Other receipts	7	11	0
Value of articles supplied free	97	4	10
Total ..	5,046	11	6
EXPENDITURE.			
Purchase of seeds and plants	90	8	0
Repairs of premises	1,566	11	11
Postage and service telegrams	26	11	6
Bearing charges	0	5	6
Country stationery	0	4	0
Purchase of implements	141	14	6
Repairs of tools and plant	15	14	0
Feed and care of cattle	561	9	6
Manure	223	0	5
Variable labour of agriculture	1,610	10	4
Employees paid from contingency	1,170	9	9
Irrigation charges	106	5	3
Variable labour of earth-work	73	6	9
Packing and freight	202	13	0
Binding charges	10	10	0
Miscellaneous	527	13	9
Wire fencing	137	9	11
Total ...	6,466	14	1
Pay of the establishment	2,429	15	0
Travelling allowance	28	5	0
Total ...	2,458	4	0
GRAND TOTAL ...	8,925	2	1

D. CLOUSTON,
Deputy Director of Agriculture,
Southern Circle,
Central Provinces.

GOVERNMENT
EXPERIMENTAL FARM
AT
THARSA

Scale 330 = 1 inch.



Report on the Telinkheri Seed Farm for the year 1913-14.

The area under this farm was increased last year from 72 to 125 acres. The new area acquired is mainly being utilised for the production of fodder crops for the cattle of the Telinkheri Dairy farm. The fodder crops grown are—clover, rabi *juar*, *san* hemp and maize in the irrigated area and *kharif juar* in the unirrigated area. The total quantity of each of these fodders produced during the year under report is shown in the statement below :—

Name of fodder.	Quantity during the year in lbs.
1. Clover	1,75,595
2. *Juar karbi*	23,750
3. Rabi *juar*	10,000
4. *San* hemp and maize ...	67,000

In addition to these, small quantities of Guinea grass and wild sugarcane were raised. These fodders are supplied to the members of the Co-operative Dairy Society at prices which are much below those prevailing in the bazaar; the farm receipts suffer in consequence.

Owing to the heavy rainfall from the middle of July to the middle of August 1913, *juar* suffered from water-logging and the luxuriant growth of weeds. Its growth was handicapped still further by the early cessation of the rains in the second week of September, which checked the growth of the crop about the time of its coming into flower; the result was a poor outturn of grain in proportion to the bulk of the crop. It was found that *juar* grown under irrigation in the hot weather gives a second cutting when cut before flowering. Maize grown under irrigation as a fodder crop gives more bulk but requires much more manure.

San hemp is undoubtedly the best of the hot weather fodders tried. It can be sown after clover without any previous cultivation, is a very hardy plant, grows fast, smothers weeds and is relished by stock if cut before flowering. It does remarkably well when sown by itself or as a mixture with maize and *juar*.

From October till April by far the most profitable green fodder to grow is Egyptian clover Berseem (*Trifolium alexandrium*). This fodder was first tried on the Telinkheri farm 5 years ago and has proved an unqualified success It is a hardy grower, yields well, and is much relished by cattle, sheep and horses. The fourth cutting over an area of 1 acre was kept for seed and yielded at the rate of 150 lbs. clean seed per acre; the crop seeded much better than it had ever done before The seed was smaller than that obtained from Egypt; when tested, 79 per cent of it germinated. That imported from Egypt this year cost about 5 annas per pound so the cost of 60 pounds, the quantity required for 1 acre, was approximately Rs. 18. Even at this price clover is easily the most profitable fodder crop under trial. It is now being grown on other Government farms in the Provinces; and will always, we hope, figure in future as the main fodder crop on dairy farms, for the successful working of which green fodders are almost indispensable On the Tharsa farm it was grown on an area of 10 acres and fed off by sheep sent there for folding on the land to be manured for cane. As a second crop after rice sown either as *utera*, that is, in the standing rice crop, or in the plot cultivated after the harvesting of rice, it does about equally well. Great care has to be taken to prevent water-logging which is fatal to the crop in its early stage. Dodder was found in small patches, but disappeared after the first cutting. From experience we have learnt that this pest is not at all serious. Some clover was made into hay and some into silage; it was much relished by the dairy cattle in both conditions.

Cotton.—Plant-to-plant selection of the three strains of Rosea under improvement has now been carried on for five years. The results obtained prove that it is possible to increase the percentage of lint to seed by continuous selection. The statement below shows the percentage of lint to seed of the original mother plant and the average lint percentage of the plants selected each year from the offspring of that plant.

No. of mother plant.	Per cent lint in 1909-10.	Per cent lint in 1910-11.	Per cent lint in 1911-12.	Per cent lint in 1912-13.	Per cent lint in 1913-14.
1	2	3	4	5	6
I	38·0	40·0	40·4	40·7	41·5
II	39·0	39·45	39·7	41·5	41·5
V	39·0	39·47	40·0	40·6	41·7

Twenty-five new crosses between Bani and Rosea were produced in the year under report. There were 360 plants in the first generation of the cross between these two varieties. The flower of Rosea is white, while that of Bani is yellow. In the first generation all the plants had yellow flowers. In the second generation there were 428 plants, of which 325 had yellow flowers and 103 had white flowers. The proportion of white to yellow was thus nearly 1 to 3. In the third generation the offspring of 58 plants, which had in the second generation been yellow, behaved as follows:—

The offspring of 19 were all yellow; the offspring of 39 broke up into yellows and whites. All the twenty-three whites of the second generation gave only white flowered plants in the third generation; the whites being recessive.

One hundred plants have been selected in the third generation on account of their length of lint and high ginning percentage, with a view to ascertain whether their characters are fixed.

Of the crosses under trial for yield, the following were grown in plots of a 20th of an acre each and yielded as shown below:—

Name of cross.	Outturn per acre.	Outturn of lint per acre.	Empress Mill valuation per boja of 245 lbs.	Value of lint per acre
1	2	3	4	5
	lbs.	lbs.	Rs,	Rs. a. p.
Bani × Rosea from Akola ...	360	108	110	34 7 0
Bani × Deshi, Lahore ...	400	138	105	42 0 0
Bani × Rosea, No. 1145 ...	480	174	100	50 12 0

Buri, Cambodia and Allan's Long Staple were again tried and yielded at the rate of 760, 820 and 600 lbs. respectively per acre.

Rice.—Seventeen varieties of rice, of which sixteen were obtained from the Economic Botanist, were tried. One hundred heads of each were selected and

weighed at harvest time. The following is a statement showing their yield per 100 heads in grams.

Statement showing the outturns of rice during the year 1913-14.

Name of rice.	Weight of 100 heads in grams.
Latia No. 86	261·4
Halad-gundi No. 12	309·7
Chinoor No. 43	261·4
Bahiabikoni No. 24	320·16
Lochinga No. 56	400·00
Bhonda No. 11	367·29
Sonth No. 102	348·6
Dantasari No. 8	301·0
Gangawalu No. 47	520·00
Gurmatia	371·3
Maha prashad No. 90	443·71
Gangikuda No. 17	375·4
Mundikath No. 88	372·8
Kotia No. 16	369·5
Latia No. 851	376·0
Tulsibhog No. 42	328·3
Jogsar No. 50	280·7

Sugarcane on the farm was again a good crop. Of the 37 varieties of cane under observation, the most promising for yield are Red Sport, Java seed 247, Phear's Pounda and Ashy Mauritius. These varieties were analysed by the Agricultural Chemist, Nagpur. The analyses are given below :—

Telinkheri sugarcanes, 1913-14.

Name of variety.	Date of crushing.	Per cent juice in canes.	Degrees Brix corrected to 20 c.	Per cent sucrose in juice.	Per cent invert sugar in juice.	Coefficient of purity.
1	2	3	4	5	6	7
Khari Batoon 2nd year, 23rd November 1912.	2nd January 1914 ...	68·4	18·87	16·55	·38	88·3
	17th January 1914 ...	67·5	18·86	16·40	·43	88·2
	1st February 1914 ...	...	21·10	19·20	·25	92·8
	14th February 1914 ...	68·1	20 60	17·97	·46	89·0

Name of variety.	Date of crushing.	Per cent juice in canes.	Degrees Brix corrected to 20 c.	Per cent sucroce in juice.	Per cent invert sugar in juice.	Coefficient of purity.
1	2	3	4	5	6	7
Khari Ratoon' 3rd year, 23rd November 1912.	2nd January 1914 ...	67·9	16·81	13·91	·67	83·0
	17th January 1914 ..	69·1	18·02	15·61	·52	88·2
	1st February 1914 ...	67·6	17·96	15·53	·43	88·0
	14th February 1914 ...	66·8	18·11	15·31	·56	86·0
Java seed 36 ...	31st January 1914 ...	71·1	19·16	16·64	·60	89·0
B. 376 ...	Do. ...	76·4	18·55	16·03	·71	88·3
Java seed 247 ...	Do. ...	70·4	18·80	16·03	·84	87·1
Red-Sport ...	Do. ...	78·1	20·81	18·82	·39	90·4
B. 1529 ...	Do. ...	73·7	21·76	19·91	·22	92·6
Villai ...	Do. ...	74·7	19·45	17·27	·36	90·7
B. 147 ...	Do. ...	76·9	19·77	17·90	·24	92·0
B. 1753 ...	1st February 1914 ...	72·1	17·76	14·74	·31	84·5
Phear's green ...	Do. ...	69·9	19·85	17·85	·37	91·8
Red Mauritius with dark stripe Bulk crushing.	Do. ...	74·1	16·46	12·99	1·24	80·4
B. 208 ...	Do. ...	75·3	17·56	15·16	·56	87·9
Gilman's Red Sport ...	Do. ...	73·7	21·76	20·09	·17	93·4
Bangla ...	12th February 1914 ...	72·6	19·24	17·49	·42	93·5
Kala from Chanda ...	Do. ...	72·0	18·12	15·07	·96	86·1
Shamsara from United Provinces.	Do. ...	72·6	21·11	18·24	·59	88·3
Striped Chanda ...	Do. ...	71·7	17·26	13·93	1·17	83·2
Bilaspur Pounda ...	Do. ...	70·8	17·21	13·90	1·02	83·2
Kajli from United Provinces ...	Do. ...	70·0	19·51	16·45	·98	86·3
Yuba do. ...	Do. ...	68·8	18·96	16·06	·57	86·8
Green Pounda do. ...	Do. ...	73·1	19·36	15·76	1·34	83·4
Katai ...	Do. ...	62·8	19·31	15·59	·25	82·7
Chini from United Provinces ...	14th February 1914 ...	47·1	20·45	16·54	...	82·5
Dhaur from Chanda ...	12th February 1913 ...	73·6	15·11	10·54	2·32	71·2
Maliagar ...	Do. ...	70·6	17·27	13·48	1·56	79·8
Red Pundia from United Provinces.	Do. ...	73·5	18·85	15·73	·96	85·3
Tana green ...	14th February 1914 ...	69·0	16·99	13·24	1·65	80·7
Tana striped ...	Do. ...	72·3	17·54	13·77	1·27	81·2
Striped Mauritius ...	Do. ...	71·3	21·54	19·71	·23	93·0
Red Mauritius ...	Do. ...	72·8	18·29	14·89	1·53	84·1
Pundia ...	Do. ...	75·2	17·59	14·22	1·35	83·6
Pounda ...	Do. ...	72·6	21·01	19·02	·47	93·2
Ashy Mauritius ...	Do. ...	72·1	20·79	19·06	·29	9·48
Lanji ...	Do. ...	71·2	21·01	19·07	·37	93·5
Sannabille ...	Do. ...	66·2	19·51	17·22	·61	91·1
Bansi ...	Do. ...	68·9	18·46	15·71	·72	87·5

The percentage of cane affected by stem-borer, the average number of canes per stool, average weight of each cane and its value as a ratooner are given in the statement below :—

Name of variety.	Percentage of Borers.	Average number of canes per clump.	Average weight of cane in lbs.	Quality as a ratooner B.—Bad G.—Good F.—Fair V. G.—Very good.
1	2	3	4	5
Java seed 36	10	20'0	4'0	B.
B. 376	12'0	6'0	5'4	B.
Java seed 247	...	13'0	6'0	G.
Tana green	8	4'3	9'0	B.
Red Sport	...	11	7	G.
B. 1753	4'5	3'6	4'2	B.
B. 1529	17	4'5	2'5	F.
Vellai	...	2'5	5	B.
B. 147	3	7	3	B.
Tana striped	...	3'0	6	B.
Phear's Pounda	9	6'7	7'2	F.
Striped Mauritius	...	5'2	4	F.
Red Mauritius	15	5'0	5	F.
Pundia ...	9	3	6	F.
Red Mauritius, black stripes	8	4'0	5	F.
Pounda	10	2'0	5	F.
Ashy Mauritius	12	6'0	6	G.
B. 208	4	5'0	5	G.
Gilman's Red	7	7'0	3	G.
Lanji	10	6	3	F.
Red Mauritius Sport	30'0	7	2'5	B.
Bangla	...	6	3'5	B.
Kala Chanda	5	12'0	3'5	B.
Katai	...	23'0	2	V. G.
Bilaspur Pounda	...	2'0	3	B.
Sannabille	...	10'2	4	V. G.
Kajli	7'0	6'0	3	B.
Green Pounda	...	6'1	5	F.
Yuba	...	20'0	3	V. G.
Balaghat Thin	...	1'0	2	B.
Bansi	...	...	2	G.
Red Pundia	30	3'5	3'5	B.
Green Mauritius	...	1	4	...
Chini	...	25'0	1'5	V. G.
Khari	...	20	2'0	V. G.
Dhaur	...	4	3'0	...
Striped Chanda	11	15	3	F.

Red Pundia from United Provinces, the two Red Mauritius canes and B. 1529 were most affected by borer. Chini, Katai, Yuba, Khari and Java 36 tillered best as plant canes. Green Tana, Phear's Pounda, Ashy Mauritius and Java 247 produced the heaviest canes, while the best ratooners were Katai, Sannabille, Chini and Khari. Java 36 was attacked by black smut.

Of the ten orphan boys sent to the farm for training by the Scottish Episcopal Mission, Chanda, one has been appointed as *kamdar* for the Porla Estate under Court of Wards, Chanda; two have been taken into the Department as kamdars for demonstration work, a fourth is now *jamaaar* on the Telinkheri farm and a fifth has gone to Chhuikhadan State to demonstrate the method of sowing cotton in lines and of using the *daura* and *dundia* for interculture. Three boys are still on the farm.

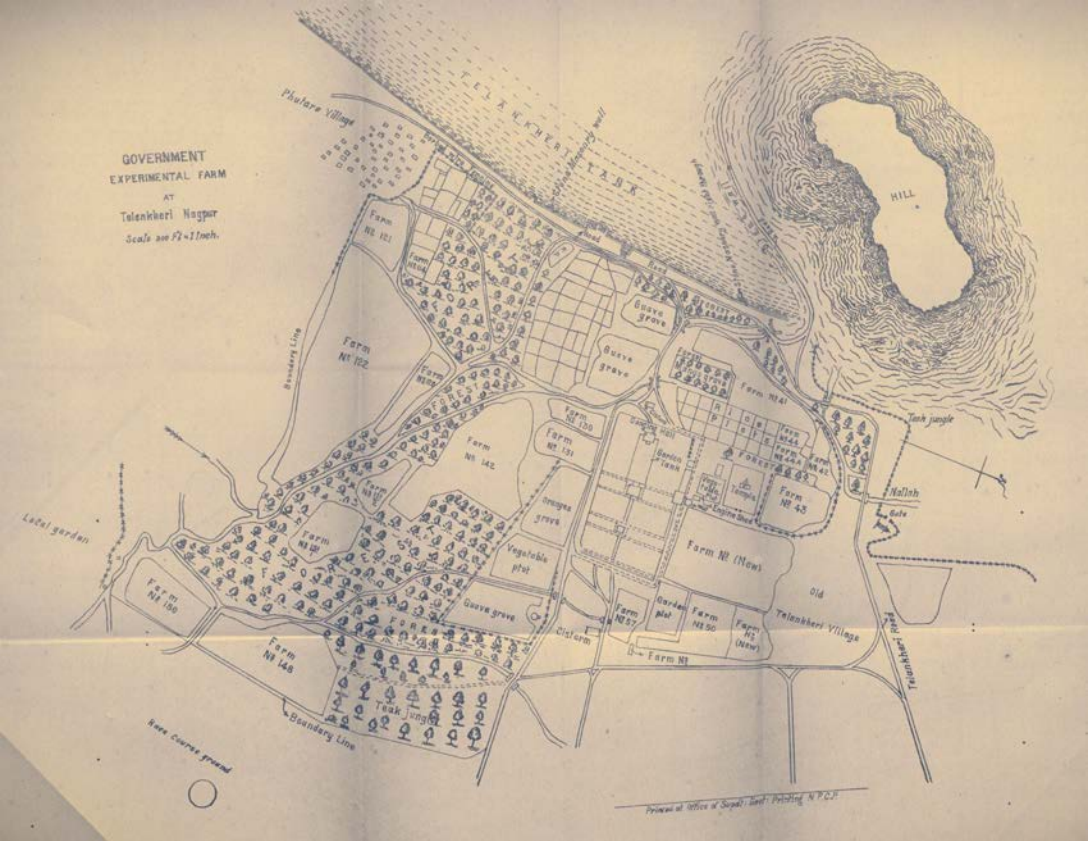
The farm staff worked well throughout the year. G. D. Mehta, Overseer of the Dairy Farm, performed his duties very creditably, both in managing the dairy and in controlling the Gaolis of the Co-operative Society attached thereto. D. G. Sawargaonkar, Overseer of the Seed Farm, did exceptionally good work in connection with the crossing and selection of cottons on the farm. G. K. Kelkar, who was Superintendent of the Farm till April, when he was transferred as Superintendent of the Tharsa Experimental Farm, promises to be a very good Farm Manager.

The statement showing the receipts and expenditure on the farm from 1st July 1913 to 30th June 1914 is given below:—

Statement showing the receipts and expenditure on the Seed Farm, Telinkheri, Nagpur, for the year 1913-14.

Receipts—Particulars.	Amount.	Expenditure—Particulars.	Amount.
1	2	3	4
	Rs. a. p.		Rs. a. p.
Sale of cotton ...	604 11 6	Pay of Establishment ...	1,210 0 0
Do. of grain ...	206 7 9	Repair of premises ...	49 1 3
Do. of gram ...	491 6 11	Purchase of implement ...	136 11 7
Do. of clover ...	332 8 10	Repair of tools and plant ...	73 0 0
Do. of *gul* and sugarcane ...	169 6 10	Variable labour on account of agriculture.	1,596 0 0
Do. of bamboos ...	164 1 0	Servants paid from contingencies ...	1,317 5 0
Do. of green fodder ...	50 7 6	Feed and care of cattle ...	1,158 11 4
Do. of *karbi* ...	80 3 10	Postage ...	20 0 0
Miscellaneous ...	142 8 0	Miscellaneous including cart hire, Railway freight, &c.	318 7 11
Value of clover supplied to C. B. Farm ...	511 14 0		
Do. do. gaolis ...	92 14 2		
Value of sugarcane 350 supplied to Tharsa.	21 14 0		
1 0. do. 746 to Sindewai farm...	46 10 0		
Value of paddy seed supplied to Tharsa farm, Sindewai farm and Raipur farm.	9 5 9		
Value of bamboos supplied to Messrs. Byramjee and Co.	20 0 0		
Value of grass carted to C. B. Farm. ...	760 0 0		
Total ...	3,704 8 1	Tota ...	5,879 5 1

D. CLOUSTON,
Deputy Director of Agriculture.


GOVERNMENT
EXPERIMENTAL FARM
AT
Telenkheri Nagpur
Scale 200 ft = 1 inch.
Phulora Village
Boundary Line
Farm Nº 122
Farm Nº 121
Farm Nº 142
Farm Nº 130
Farm Nº 131
Farm Nº 141
Farm Nº 43
Farm Nº (New)
Farm Nº 57
Farm Nº 90
Farm Nº (New)
Farm Nº 148
Farm Nº 150
Guava grove
Vegetable plot
Oranges grove
Garden plot
Tank jungle
Nallah
Gate
Old Telenkheri Village
Telenkheri Road
Local garden
Race course ground
Boundary Line
HILL
Printed at Office of Superintendent Printing N.P.O.P.

CATTLE AND SHEEP-BREEDING OPERATIONS.

TELINKHERI BREEDING FARM.

Active steps are now being taken with very definite aims in view, to improve the breeds of cattle in the Southern Circle. The measures adopted will be described under the following heads :—

The Telinkheri Cattle-breeding Farm.
The Telinkheri Dairy and Breeding Farm for Dairy Stock.
The Chandkhuri Cattle-breeding Farm.
Co-operative Cattle-breeding Societies.
Private Cattle-breeding Farms.
Food stuffs for breeding farms and Dairy stock.
Sheep-breeding.

2. The grazing area under the Telinkheri Cattle-breeding Farm has been described in previous reports as forming part of a stony hill covered with a thin layer of brown soil, resting on trap rock which is everywhere near the surface. The grass is mainly spear grass (*H. contortus*). The pasture except during the rains is very poor; in a soil of this kind the grass is soon withered up by the dry weather which sets in after September. This species is a very slow grower, too, and affords no grazing worthy of the name till two months after the rains break.

3. In the year under report and during my absence on leave the farm suffered very badly. Rinderpest broke out on the herd for the first time. The cattle had been previously inoculated on the 7th of April but inoculation did not prove to be entirely effective, either in making cattle immune or in lessening the virulence of the attack. By the end of May 13 had died including 6 calves. Decimated by this virulent disease, and emaciated by under-feeding, the herd suffered later from tick fever which often follows on the heels of rinderpest. In all 36 cattle died between the 10th April and 10th of October.

4. Since my return from leave in October I have given a good deal of personal attention to the farm, and have adopted stringent measures to prevent similar outbreaks. With nearly 400 head of cattle, including 200 belonging to the Co-operative Society of Gaolis to control, the task is a more formidable one than it used to be. Since the 10th of October 1913 three young calves only have died.

5. The Veterinary Department is of opinion that tick fever has come to stay on this farm and prophesied that it would break out again without fail in the hot weather or early rains. That Department further advised that to provide against a disaster similar to that which occurred last year all the cattle of both the Dairy and Breeding-farms should be removed to a distant grazing ground for a space of 15 months. Luckily those gloomy forebodings have not been fulfilled. Under more careful management the conditions which led to such heavy mortality will not again be allowed to exist. The statement below shows the number of deaths and births in the herd for the year from the 1st July 1913 to the 30th June 1914 :—

Statement showing casualties on Cattle-breeding Farm, Telinkheri, from 1st July 1913 to 30th June 1914.

Description.	Balance on 1st July 1913.	Receipts.		Total.	Out-goings.			Total.	Balance on 30th June 1914.	Remarks.
		Births.	By transfer.		Deaths.	Sale.	Transfer to other heads.			
1	2	3	4	5	6	7	8	9	10	11
Cows ...	58	...	8	66	2	8	1	11	55	
Bulls ...	2	...	...	2	...	...	1	1	1	
Cow calves ...	47	15	6	68	5	3	5	13	55	
Bull calves ...	36	16	3	55	4	10	5	19	36	
Total ...	143	31	17	191	11	21	12	44	147	

6. Nine young bulls for stud purposes were sold during this year: the highest price obtained was Rs. 250 and the average price Rs. 177-12-0 as compared with Rs. 172-8-0 in 1912-13.

Owing to heavy expenditure in connection with the outbreak of disease the farm shows for the year a net loss of Rs. 2,341-4-6 against the net profit of Rs. 1,300 in 1912-13 and of Rs. 2,134-9-0 in 1911-12. The statement below shows the receipts and expenditure of the farm from 1st July 1913 to 30th June 1914.

Cattle Breeding Farm.

Receipt.		Expenditure.	
Particulars.	Amount.	Particulars.	Amount.
	Rs. a. p.		Rs. a. p.
Sale of bulls ...	1,600 0 0	Pay of permanent establishment ...	455 0 0
,, manure ...	155 8 0	Feed and care of cattle ...	2,606 0 0
,, other animals ...	127 12 0	Servants paid from contingencies ...	786 0 0
Miscellaneous receipts ...	7 2 6	Purchase and repair of implements ...	130 0 0
Free supply of four bullocks to seed farm.	300 0 0	Miscellaneous including extension of sheds.	554 11 0
Total ...	2,190 6 6	Total ..	4,531 11 0

The Telinkheri Dairy Farm.

7. The herd on the Telinkheri Dairy Farm consists of 80 animals belonging to Government and 218 belonging to the Gaolis of the Co-operative Dairy Society. About 120 acres of the area under the breeding-farm has been set aside for the dairy cattle: an additional 800 acres were acquired, bringing up the total area under this farm to over 900 acres. This land adjoins the cattle breeding farm and is of exactly the same type of poor hilly soil which affords very little in the way of grazing after November, owing to the thinness and stoniness of the soil.

The Government herd now consists of—

22 Delhi buffaloes.

1 Jafarabadi buffalo.

7 Local buffaloes.

1 Hansi cow.

14 Gaolao cows.

1 Delhi buffalo bull.

1 Ayrshire bull.

33 Young stock.

Total 80

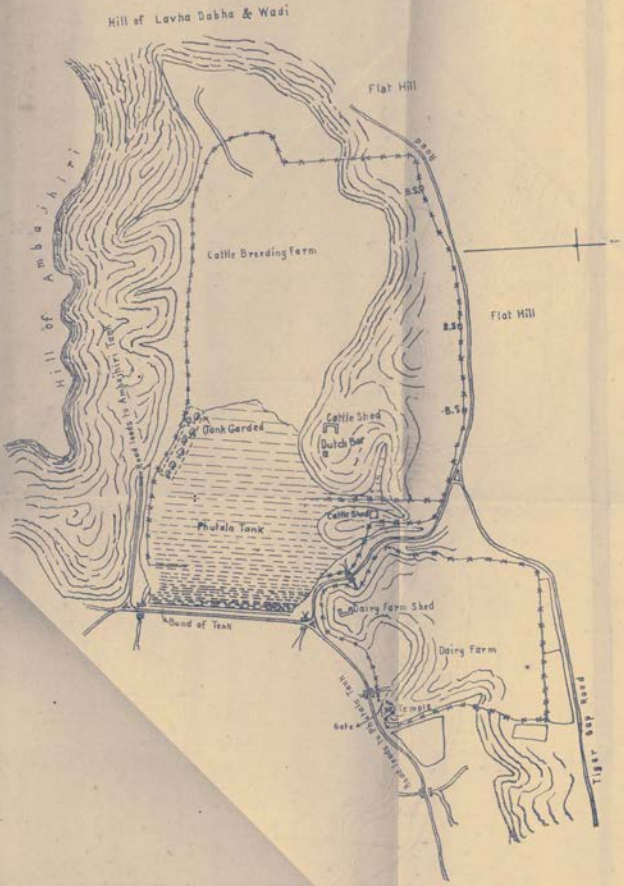
CULTIVATED AREA
TELINKHERI HILL ROAD
DAIRY FARM
CATTLE SHED
CATTLE SHED
PHUTALA
TANK

SITE PLAN

SHOWING THE DAIRY & CATTLE BREEDING FARM

AT NAGPUR

Scale 8 inch



Rinderpest followed by tick fever, which played such havoc on the Cattle Breeding Farm, did serious damage to this herd too. In all 10 died before the 10th of October. In addition to these there were 9 animals including a Montgomery bull, which, though they did not succumb at the time were incapacitated for breeding purposes, and three of them died before the end of the year under report. In addition to these, two animals got their legs broken and one cow got killed on a new design of iron manger substituted at the time of the outbreak for the wood and mud arrangement, which was supposed to harbour ticks. The strength of Government herd at the end of the year is shown in the statement below :—

Statement showing casualties on the Dairy Farm, Telinkheri, from 1st July 1913 to 30th June 1914.

Description.	Balance on 1st July 1913.	Receipts.			Total (2+3+4+5).	Out-goings.			Total (7+8+9).	Balance on 30th June 1914.	Remarks.
		Births.	By transfer	By purchase.		Deaths.	Sale.	Transfer to other heads.			
1	2	3	4	5	6	7	8	9	10	11	12
Buffaloes ...	15	...	...	16	31	1	...	...	1	30	
Buffalo-bull ...	1	...	...	...	1	...	...	...	...	1	
Do. male calves.	6	1	...	8	15	4	...	...	4	11	
Do. female do.	4	8	...	...	12	4	...	...	4	8	
Cows ...	19	...	...	...	19	1	..	3	4	15	
Bulls ...	1	...	1	...	2	...	...	1	1	1	
Cow-calves ...	7	2	..	...	9	...	...	4	4	5	
Bull-calves ...	6	8	...	...	14	2	...	3	5	9	
Total ...	59	19	1	24	103	12	...	11	23	80	

Average milk yields.

8. The number of cattle under observation was 6 Delhi buffaloes, 5 local buffaloes and 14 cows of the Gaolao breed. The Delhi buffaloes were purchased two and a half years ago : they represent the ordinary Delhi type, but are not selected animals in any sense of the term. They fall off as milkers when brought to these Provinces, due most likely to change in climate and absence of good grazing. They are, however, better milch animals than the local breed, and very much better than the local cow. From data obtained on this farm it has been ascertained that with a herd of 100 Delhi milch buffaloes, fed, housed and tended as they are on this farm at present, a profit about 8 per cent on the outlay can be made : with local buffaloes the profit would fall to 5 per cent ; while a dairy of 100 cows of our local breed would be run at a loss of 1 per cent.

The milk yields of the animals under observation are given below:—

Delhi Buffaloes.

Name of animal.	Quantity of milk supplied during 1913-14.		Quantity of milk supplied during last lactation period.		Period of lactation in days.	Average milk yield per day during lactation period.		Remarks.
	Lbs.	ozs.	Lbs.	ozs.		Lbs.	ozs.	
Jamuna	3,548	12	3,671	6	327	10	14	
Demai	2 320	...	3,010	14	310	9	12	
Kamalja	2,685	6	2,878	10	294	9	12	
Sakhri	1,810	8	1,810	8	225	8	...	
Bagi	1,332	14	1,332	14	173	7	12	Aborted in 9th month of gestation.
Buri	1,941	12	1,491	8	210	7	2	
Rosa	1,432	8	These buffaloes were only purchased in the month of March 1914 and have not therefore completed a lactation period.					
Beli	1,261	4						
Shardul	1,137	...						
Zabulla	829	...						
Bhillan	748	4						
Gajra	717	8						
Kundal	581	...						
Zankar	453	8						
Local Buffaloes.								
Nagra	2,027	2	2,090	6	245	8	8	
Bagirathi	1,343	2	2,216	6	332	6	10	
Jugni	996	...	996	...	243	4	2	
Chadna	1,250	12	Have not yet completed a lactation period.					
Bichua	958	8						
Selected Gaolao Cows.								
Dhondi	1,170	14	1,671	14	443	3	12	
Girji	1,086	6	1,638	8	336	4	14	
Ladki	954	0	835	6	239	3	10	
Sawitri	735	14	916	8	216	4	4	
Godi	637	2	1,610	9	493	3	4	
Mukki	564	2	600	14	282	2	2	
Moti	481	4	1,201	...	356	3	...	
Mandi	361	6	1,561	14	530	3	...	
Batashi	337	2	1,173	6	320	10	3	

Name of animal.	Quantity of milk supplied during 1913-14.		Quantity of milk supplied during last lactation period.		Period of lactation in days.	Average milk yield per day during lactation period.		Remarks.
	lbs.	oz.	lbs.	oz.		lbs.	oz.	
			SELECTED GAOLAO COWS.					
Demi	1,101	0	...	...	...	...	...	Have not yet completed a lactation period.
Hansi	848	0	...	...	...	...	...	
Gundel	623	8	...	...	...	...	...	
Dodki	488	0	...	...	...	...	...	
Manka	169	2	...	...	...	...	...	

These yields are low, but it must be borne in mind that each animal also suckles her own calf as well. Forty-six analyses of cows' and 54 analyses of buffaloes' milk were made. The average percentage of butter fat given by the cows was 4·7 per cent and by the buffaloes 7·3 per cent.

9. The four Hansi cows and one bull of the Montgomery breed did not do well. Two of these cows died during the outbreak of rinderpest: another weakened by the disease survived for a few months and then died. The Montgomery bull obtained from Pusa got so weak and emaciated during the outbreak that he proved useless for breeding purposes after that and was therefore presented to the Gorakshan (cow hospital) in Nagpur. It took some time to get over this disaster and to regain the confidence of the gaolies of the Co-operative Society who had lost 12 buffaloes and 7 cows during the outbreak. The whole dairy herd is now in good health again and the Gaolies are as contented as such men are ever likely to be.

The expenditure on the Dairy Farm is high owing to the amount spent in connection with the outbreak of disease on the farm. The balance sheet for the year is shown below:—

Dairy Farm.

Receipts.	Rs.	a.	p.	Expenditure.	Rs	a.	p.
Sale of milk ...	3,076	11	4	Pay of permanent establishment ...	495	0	0
Do. grass ...	236	5	1	Servants paid from contingencies...	1,098	14	6
Grazing fees ...	673	2	0	Purchase and repair of implements.	500	11	0
Free supply of grass to Gaolies and Nagpur Farm ...	1,563	0	0	Feed and care of cattle ...	1,830	0	0
				Cutting and carting grass ...	1,216	13	0
Total ...	5,549	2	5	Total ...	5,141	6	6

The main object in view on this farm is to breed better milch animals for these Provinces than is obtainable locally at present. This we hope to do by selection and crossing. The buffalo is a much better dairy animal than the cow. She is more docile and therefore more easily handled, and she is much less dainty as a feeder. Delhi buffaloes thrive well in these parts though they fall off to some extent in yield of milk. Both pure Delhis and Delhi x Nagpur crosses are being reared for the dairy: 15 calves of the former have been

obtained. Ten of the best milkers from the Telinkheri breeding herd of Gaolao cows already described have been taken to the Dairy for experimental purposes. These have been crossed with a bull of the Montgomery breed and 7 Gaolao-Montgomery crosses have been obtained. These are slightly larger in size, heavier in the bone, and less active in their movements than pure Gaolao calves. They will be tested for milk and draught purposes when they come of age.

The Co-operative Society of Gaolis.

There are at present 13 members in the Society possessing 71 buffaloes, 54 cows and 92 young animals. The rate at which milk is supplied to Mr. Byramjee, the contractor who distributes it, was raised in November of the year under report from 9 seers to 8 seers for buffalo, and 8½ seers for cow's milk per rupee. Customers are charged at the rate of 6 seers per rupee, thus leaving a margin of 2 seers and 2½ seers respectively to cover the cost of distribution as well as interest and depreciation on the cost of the Dairy building and appliances.

The total quantity of milk, butter and cream distributed by this Dairy was 149,898 lbs., 109 lbs. and 139 lbs. respectively, of which the Society supplied 112,541 lbs. of milk worth Rs. 6,733-3-8. For food stuff and grazing they paid Rs. 3,615-9-0, leaving them with a profit of Rs. 3,117-10-8. The members of the Society have during the year borrowed Rs. 2,000 from the Central Bank, of which they have paid back Rs. 1,389. A further loan of Rs. 1,600 is to be given them in August for the purchase of more milch buffaloes.

Gaolies' Accounts.—Food stuffs are issued daily to the Gaolies by the farm staff and at the end of the month each member is charged for the same, the cost being deducted from his milk bill for that month as paid by Mr. Byramjee. The statement below shows the receipts and expenditure of the Society for the year on the 30th June 1914.

Months.	Number of animals.			Value of milk supplied.	Cost of foods and fodder purchased.	Profit.
	Milch.	Dry.	Total.			
				Rs. a. p.	Rs. a. p.	Rs. a. p.
July 1913 ...	50	132	182	463 15 11	251 11 11	212 4 0
August 1913 ...	42	146	188	427 2 9	200 12 10	226 5 11
September 1913 ...	52	135	187	454 11 5	184 8 1	270 3 4
October 1913 ...	67	123	190	567 12 9	256 3 7	311 9 2
November 1913 ...	72	114	186	659 12 2	311 11 4	348 0 10
December 1913 ...	72	121	193	727 1 9	311 13 9	415 4 0
January 1914 ...	78	117	195	799 11 7	346 8 7	453 3 0
February 1914 ...	77	117	194	695 7 5	345 4 4	350 3 1
March 1914 ...	65	128	193	633 7 0	320 5 2	313 1 10
April 1914 ...	55	127	182	497 11 2	346 13 0	150 14 2
May 1914 ...	56	122	178	438 0 9	388 9 6	49 7 3
June 1914 ...	50	123	173	368 5 0	351 2 11	17 2 1
Total for the year ...	736	1,505	2,241	6,733 3 8	3,615 9 0	3,117 10 8

The profit made is very satisfactory considering that the expenditure includes the cost of maintaining 125 dry animals on an average. It amounts to a profit of Rs. 51 per head on the average number of milch animals maintained.

All the concentrated food-stuffs are supplied by the Department at cost price which is about 25 per cent lower than bazaar rates. The bulky fodders, including *juar karbi*, hay and green fodders, are grown on and supplied from the Telinkheri Seed Farm : all these are also supplied at rates which are at least 25 per cent lower than the market value of the produce. Grazing charges for both dry and milch cattle have been reduced to 4 annas per month. The average cost to the members for the year of keeping a milch animal has only amounted to Rs. 4-0-3 per month, while the average per head of dry stock was Re. 0-7-0. For this they are indebted to the generosity of Government. Not only are they supplied with cheap grazing and cheap food-stuffs, which are carted to them, but sheds are provided free of cost for their whole stock.

10. In the yearly part of the year the Gaolies still continued to give trouble to our staff. They stole food-stuffs, drove their cattle into farm crops, broke down our fencing, to make trespass more easy, entered closed grazing areas whenever they got a chance, and disobeyed orders with the cool indifference of a class which has never been accustomed to submit willingly to rules restricting their grazing rights. They have been brought more or less to heel by a system of judicious rewards and punishments which have been brought into force, but still give trouble at times. They only obey regulations because it pays them to do so. They have been treated so generously by the Department on the other hand that they are in the enviable position of having no real grievance.

Chandkhuri Cattle Breeding Farm.

11. The Chandkhuri Cattle Breeding Farm opened towards the close of last year comprises an area of 268 acres of land, the greater part of which is *bhata* and *bhata matasi*. The whole area was formerly a fodder reserve, but, as the grass produced is mostly spear grass, neighbouring cultivators never purchased the hay for feeding purposes. Here, as in the case of Nawagaon Fodder Reserve, the grass was used for thatching only. Most of the area is irrigable from Kurud tank ; clover and *juar* were grown during the cold and early hot weather and good yields of first class green fodder were obtained.

As a grazing area the site selected for the farm is comparatively poor ; but by supplementing the grazing, such as it is, with clover, green *juar* and a little hay and one pound of cotton seed and *til* cake per head from January till the middle of July, the herd was kept in good condition throughout the year.

12. The cows and bulls for this farm were purchased by the Divisional Superintendent of Agriculture and myself last year. They were obtained from Ambagarh Chauki and Panabaras in Drug, and from Bindra Nawagarh in Raipur. The Chhattisgarh breed can be seen at its very best in these jungly Zamindaris, where grazing is cheap and plentiful. This has attracted to those parts large numbers of Banjaras, a nomadic tribe of professional cattle breeders, some of whom have now settled there. They have herds of from one to six hundred head of cattle, most of which are of the better type of the Chhattisgarhi breed ; but there is a mixture also of the larger long-horned Ramgarhi cattle from Mandla ; for their search for good and cheap grazing sometimes draws them far afield.

The statement below shows the number of animals in the herd at the end of the year :—

Cows	Bulls.	Young stock.	Total.
60	1	50	111

Quarters for the staff were completed and half of the farm was fenced during the year, so the farm is now complete in every respect.

The main object of this farm will be to rear good cows and bulls for the owners of private breeding farms. It will also serve as a model for private and co-operative breeding farms, for which it is almost impossible at present to get good Chhattisgari bulls.

Wild Cattle.

13. Thirteen semi-wild cattle were caught at Siltara in April of this year. All the herd of about 50 with the exception of 3 cows and 4 calves have now been accounted for. One of the bulls captured last year was given on loan to the Nawagaon Co-operative Cattle Breeding Association : our repeated efforts to get good stud bulls for this and other breeding herds have ended in failure.

The Nawagaon Co-operative Cattle Breeding Society.

14. This society was started on the initiative of the Department in April 1913. It was at first intended to run it as a Joint Stock Company, but it was decided later to register it as a Co-operative Cattle Breeding Society. Owing to a misunderstanding between the Registrar and the Department, actual registration was not effected till November 1913.

Nawagaon Reserve, which has been handed over to the Society by Government, comprises an area of 492 acres. The soil of the area is nearly all poor *bhata* and produces mostly spear grass. It has been conclusively proved by a feeding experiment carried out over a period of 3 years that, if cut before the spears have had time to mature, this grass makes an edible hay of fair quality, and that in this class of soil good spear grass silage can be made if cut in September.

It is a well known fact that the cattle of Chhattisgarh are the poorest to be found in the Provinces and the least cared for by their owners. The breed being very small, the bullocks are considered too weak for draught purposes in other districts; consequently there is no outside demand for them and locally they sell at from Rs. 10 to Rs. 20 each. It is the custom to keep a large herd in every village, though there is very little grazing worthy of the name, the grazing areas being mostly *bhata* areas which are below the margin of cultivation. For stall-feeding, the cows and young stock get little but rice straw and only enough of that to ward off dire starvation. Under these circumstances it will be gathered that cultivators of this tract take very little interest in the breeding of cattle. The Nawagaon Society has been started primarily with the object of interesting as many as possible of the leading land owners in this branch of husbandry.

15. The Society now consists of 20 members, each of whom has from one to six cows on the farm. The whole herd at present consists of 60 cows, one bull and 38 young stock. The cows were all purchased in the Zamindaris by the Divisional Superintendent of Agriculture or myself : the bull has been given on loan to the Society by the Department. All the cattle above 6 months and below 12 years of age have been insured against disease and accident.

The rules of the Society are given below :—

(1) There will be one or more stud bills owned by the Society. They will be selected and passed under the orders of the Deputy Director of Agriculture. When past work they will be sold and the proceeds credited to the Society's account.

(2) The entire treatment, care and distribution of the services of the bulls will be under the control of the Committee of five persons mentioned in by-law 7.

(3) A Herd Register of cows and calves will be maintained by the Committee. In it will be entered only those cows, the private property of members, which have been selected and passed under the orders of the Deputy Director of Agriculture as fit for breeding purposes, and calves out of such cows by the stud bull.

(4) All cows entered in the Herd Register must be kept continuously on the pasture land of the Society.

(5) Not more than 60 cows in all will be permitted to be registered, of which not more than 6 may belong to any one member.

(6) None but registered cows will, under any circumstances, be permitted to enter the pasture area of the Society.

(7) The services of the Society's bull will be exclusively reserved for the registered cows. But in default of registered cows, its services may, under the special orders of the Committee, be hired out for the use of unregistered cows preferably those belonging to members of the Society. But no record will be kept in the Herd Register either of such services or of the young stock so produced from unregistered cows.

(8) The entire treatment and control of the registered cows will be with the Committee who will also have absolute discretion in regard to their expulsion from the pasture area or exclusion from the Register.

(9) A serving fee of one rupee for each cow will be paid by the owner of the cow to the funds of the Society.

(10) A grazing fee of one rupee for each cow and of annas eight per annum for each calf admitted to the pasture area will be paid by the owner of the cow or calf to the funds of the Society. In addition to this, all charges incurred by the Society in the feed and treatment of the cows and calves must be defrayed by the owners, as the Committee may direct.

(11) All calves will be the private property of the owner of the cow which bears them. Those born from registered cows will be duly registered. But the owner will be at liberty to remove his calves from the pasture area at any time, or dispose of them in any way he pleases, provided that, if he contravenes the advice of the Committee in regard to their treatment, the Committee will have full power to expel any calf from the pasture area or to strike it off the Herd Register.

An inspection book is maintained on the farm, and members are encouraged to inspect the herd and to offer any suggestion which may occur to them. The farm has been inspected regularly by the staff of the Department during the year.

The staff maintained by the Society consists of one *kamdar*, one *chaukidar* and one herdsman. For a year or two there will be little to show in the way of receipts except from the sale of grass.

The Khandwa Co-operative Cattle Breeding Society

The Khandwa Cattle Breeding Society was registered in May 1914. To this Society Government has leased the Pachera Reserve of 288·85 acres near Khandwa village. The cows were purchased in the zamindaris for the Society by the Divisional Superintendent of Agriculture and myself. The herd consists of 40 cows and young stock. Unlike the Nawagaon Society, this Society has drawn all its members from two villages—Khandwa and Kurra—of which the Malguzar is Khan Sahib Israil Talabuddin, a most enterprising land-owner, who is allowed 20 cows, *i. e.*, half the whole number. Some of the members are poor and have borrowed from their village Co-operative Society the money with which to buy their cows

Of the five existing cattle breeding farms in the Zamindaris of this Division I inspected four in the year under report. The dearth of good bulls is the chief difficulty everywhere. No attention being paid to breeding, the best young bulls are castrated. The stud bulls kept by Banjaras are generally good animals, but each keeps only the number required for his herd of cows. Moreover, a good many of the largest of these bulls have been purchased outside this Division and are not therefore of the type required for a herd of Chhattisgarhi cows. Of the four herds inspected, that of the Indagaon Cattle Breeding Farm in Bindra Nawagarh is the best: both cows and bull are of the true Chhattisgarh type and of a good size. The cattle of Khariar Cattle Breeding Farm are in good condition but are a mixed lot, the bull and some of the cows being of the

Ramgarhi breed farm from Mandla. When the selection of cattle for a breeding farm of this kind is left to the Zamindar or to the manager, when the State is under Court of Wards, the mistake is sometimes made of choosing big animals, quite irrespective of the breed to which they belong. For their future guidance, photos of a typical Chhattisgarh bull and cow have been sent to the Deputy Commissioners concerned. The other two cattle breeding farms inspected were those of Mohalla and Ambagarh Chauki in Drug district. The cattle of the former were in good condition, but cows and bulls though true to type are rather small : a better bull is required for this herd. The Ambagarh Chauki herd was not in such good condition : there, too, the bull and most of the cows are distinctly small Till Government can supply bulls from the Chandkhuri farm, progress on these farms will be slow. On all four farms stall feeding with hay is practised and for the Mohalla and Ambagarh Chauki herds a small quantity of green fodder was being grown.

Food-stuffs for cattle.

From a series of feeding experiments carried out on the Telinkheri farm, in which undecorticated cotton cake was compared with cotton seed and til cake, cotton cake proved to be the cheapest at present prices, and it is now the principal concentrated food-stuff in use on the farm. The rations fed to the buffaloes and cows in milk on the Telinkheri Dairy Farm consists of cotton seed, undecorticated cotton cake, cotton seed husk, wheat bran, *til* cake and *chuni* (crushed *tur*). From November till the end of April clover was fed on a generous scale, as much as 40 lbs. being given daily to some animals. In May clover silage was used, and in June and July green *juar* maize and *san* hemp took the place of clover. As a fodder crop, clover is by far the best that we have yet tried. It yields on an average 20,000 lbs. per acre and is much relished by cattle. The best hot-weather fodders are *san* hemp, maize and *juar*. These were grown separately and as a mixture. *San* hemp is the hardiest and did quite well when sown in fields after clover without any previous cultivation. When it is fed before the stalks become coarse and hard, cattle eat it greedily. Where there are irrigation facilities, the feeding of a herd of cattle is a comparatively easy problem. Green fodders can be grown throughout the year. From October till the end of April there is no better fodder than clover : for the rest of the year *san*-hemp, which adapts itself to different classes of soil as well as to the different seasons, is the very best green fodder that can be grown as far as our present knowledge goes. It can be supplemented by a little green *juar* and maize, both of which also do well as hot weather crops. Green fodders have proved to be particularly suitable for dairy stock. It increases the milk yield very much in the hot weather. Dairy cattle when stall-fed during the heat of the day, *i. e.*, from 10 a. m. till 4 p. m., do better on a very little clover, *san*, *juar* or maize, than when allowed to graze during that time.

It is always advisable to give a small allowance of hay when green fodders are fed in large quantities, in order to prevent scouring : for this purpose from 3 to 4 lbs. per head will suffice. Grass intended for hay should be cut when in flower and before the seed matures. This rule, while applying to all the different species which are found in these Provinces, is specially important in the case of spear grass. The Nawagaon feeding experiment carried out over a period of three years proved conclusively that this grass, which is recognized locally as being useless for fodder, can be made into good edible hay, if cut before the spears form, *i. e.*, before its seed has had time to mature.

Sheep Breeding.

The mortality among sheep in the districts of the Central Provinces in which they are kept in large flocks by professional breeders, is very high. In the year under report the Department had 360 sheep on the Sindewahi Farm and 396 on the Telinkheri Farm from 5th May 1913 till 15th October 1913, and on the Tharsa Farm for the rest of the year where they were folded on the area to be cropped with cane. Of the Sindewahi flock, 99, *i. e.*, 27 per cent, died, while of the Telinkheri flock we lost 33, *i. e.*, 8·3 per cent only. The unhealthy period of the year for sheep is from July till November : sheep kept on the plains during that season where the soil is wet for most for the time, suffer to an alarming

extent. They catch cold, contract *gid*, their wounds get infested with maggots and they suffer from other ailments which are at present imperfectly understood. Their removal to a hil'y area in the beginning of the rains, where they can get a dry standing ground is wonderfully effective in preventing disease. This accounts for the comparatively low mortality in the flock kept on Telinkheri Hill during the rains, compared with that of the Sindewahi flock, which had to be grazed and folded on the lands of that farm. The Sindewahi flock has therefore been removed to Telinkheri this year, where they will be kept till the rains are over.

Three Merino rams were imported in the cold weather with a view to get a better quality of wool by crossing the local ewe with this fine-woolled breed. Unluckily two of these died, one shortly after reaching Nagpur and the second 6 months later. This breed would appear to be very susceptible to disease, so it is doubtful whether the experiment will give results of any positive value.

Report on demonstration work in Chhattisgarh Division.

The lines of Demonstration work in hand during the year were —

(1) The transplantation of rice.
(2) The cultivation of groundnut.
(3) The cultivation of sugarcane.

2. The health of the staff during the year was good. This I attribute again to the use of mosquito nets and quinine. By adopting these measures we have been able to secure for our men comparative immunity to malaria, which in the early days of demonstration in this Division proved the most formidable difficulty that confronted us in our pioneer work.

3 As the Department had been demonstrating the method of transplanting rice for the past seven years and as the advantages to be gained by adopting this new method had been made obvious by ocular demonstration in thousands of villages, it was thought that the time had come to associate the District staff more closely with the work. The new arrangement was begun in the year under review. Two Additional Tahsildars and two Revenue Inspectors, working under the orders of the Deputy Commissioners of Drug and Raipur, were put on special duty to push transplantation under Government tanks and in each tahsil the Tahsildar with his staff of local Revenue Inspectors and Patwaris used his influence in extending the area transplanted under village tanks. The Department with a staff of seven Agricultural Assistants, one Probationary Assistant, 32 kamdars and 14 trained transplanters held itself mainly responsible for the quality of the work done.

4 In consultation with the Tahsildars the block to be transplanted under each tank was as usual marked on the village map before the rains. The maximum area aimed at under Government tanks was one-sixth of the whole irrigable area. Though the whole area thus demarcated was in but few cases transplanted, still the procedure helped to keep the more backward villages up to the scratch. Nursery beds were sown in the end of May with water from the Government tanks Seedlings were ready for transplantation in July.

The area transplanted in the different Tahsils is given below :—

No.	Tahsils.	Area transplanted in the current year.	Remarks.
1	Raipur ...	3346·42	
2	Baloda Bazar ...	1610·78	
3	Mahasamund ...	3843·80	
4	Dhamtari ...	2193·06	
5	Bilaspur ...	4959·91	
6	Bemetara ...	3669·70	
7	Drug ..	2840·09	
8	Mungeli ..	309·07	
9	Sanjari ...	2971·86	
10	Janjgir ...	4449·52	
	Total ...	30194·30	

This area was scattered over 4,158 villages in the three districts.

5. It is gratifying to know that Bilaspur has at last made such a splendid start. In all these three districts there is still room for expansion, more especially under Government tanks, and this year (1914) our policy is to aim at getting one-fifth of the area commanded by Government tanks transplanted. Owing to a shortage of rain last year, village tanks did not all fill and in many cases it was found impossible to give the areas transplanted under them sufficient water Care will have to be taken in future to prevent larger areas from being transplanted under these than can be irrigated. Under Government tanks transplanted rice was a very good crop as usual.

6. Crop experiments were carried out in 52 villages to compare the cutturns of broadcasted (*biasi*) with transplanted rice by the Divisional Superintendent of Agriculture, the Additional Tahsildar, Drug, three Agricultural Assistants and two kamdars. The five leading men of each village testified as usual in every case to the accuracy of the figures submitted by the experimenter. The outturns obtained are summarised in the statement below :—

Serial No.	Villages.	Outturn in lbs. per acre of		Increase due to transplantation in lbs. of paddy per acre.	Experiments conducted by
		Transplanted.	Broadcasted.		
1	Khola ...	2730	1450	1280	Divisional Superintendent of Agriculture, Raipur.
2	Khandwa ...	2430	2050	380	
3	Labhandi ...	1910	1450	460	
4	Kawadia ...	3920	1840	2080	
5	Potia ...	2750	1760	990	
6	Mendasara ...	2740	1380	1360	
7	anakatti ...	2820	2230	590	
8	Sirasa ..	3240	2500	740	
9	Achhoti ...	2560	2240	320	
10	Arajuni ...	1470	580	890	
11	Bargohan ..	2600	1120	1480	
12	Arjunda ...	3610	1890	1720	
		4500	2620	1880	
13	Chhotona ..	3500	2310	1190	
14	Khairbana ..	920	920	...	
15	Jora ..	2030	1820	210	Tahsildar of Drug.
16	Amdi ...	5620	3540	2080	
17	Matia ...	2940	1860	1080	
18	Anda ...	3260	2020	1240	
19	Risama ..	3560	2100	1460	
20	Chirpoli ..	2310	1380	930	
21	Chingisi ...	2000	980	1020	
22	Bhardu ...	2280	1480	800	
23	Kaneri ...	2080	1160	920	
24	Naila ..	2220	980	1240	
25	Khalesa ..	1730	1460	270	
26	Seoni ..	2760	1470	1290	
27	Sarapar ..	3970	1885	2015	Durgaprasad, Agricultural Assistant.
28	Khond ..	2120	1160	960	
29	Jarawa ..	3040	1440	1600	
		3960	2200	1760	
30	Kukurdah ..	2340	1400	940	
31	Risada ..	2030	965	1065	
32	Baloda ...	2330	710	1620	
33	Dasarma ..	1880	980	900	
34	Khapri ...	1190	1060	130	
35	Kurra ..	1910	1350	560	
36	Mura ...	2600	1420	1180	
37	Baronda ..	2160	1460	700	
38	Kanki ...	1640	1210	400	
39	Kharora ...	840	440	440	Tejnath, Agricultural Assistant.
40	Kathia ...	1860	1280	580	
41	Lilji ...	1820	1690	130	
42	Moharenga ...	2300	1660	640	
43	lame ...	2090	1990	100	
44	Chimalwa ...	2900	2030	870	
45	Vione ...	3680	2150	1530	
46	Sagar ...	2820	1910	910	
47	Pond ...	2590	1760	830	
48	Chanodeya ...	2320	1460	860	Mukarjee, Kamdar.
49	Lakhasor ...	3820	2520	1300	
50	Mohatori ...	3020	2040	980	
51	Tara ...	3460	2380	1080	
52	Neora ...	2630	1670	960	

7. The average increase in favour of transplantation, as found by the different experimenters, ranges from 515 lbs. to 1,297 lbs. of paddy, while the average for all the 54 experiments carried out is 981 lbs., worth at present prices Rs. 24, leaving out of account the value of the increased outturn of straw from the transplanted plot. But to this we should add Rs. 2, which is the value of the seed saved by transplanting. The increase, though large, is less than was obtained by the Assistant and Extra-Assistant Commissioner who carried out these experiments last year on the same lines. In estimating the gain to the rice grower I prefer to reckon on an increase of only 600 lbs. of paddy per acre, because taking the gain over a period of years and over a large area, good, bad and indifferent, I find that this figure is nearly correct. The monetary value of this increase would be approximately Rs. 15 per acre. We may take it that the transplanting of 30,194 acres has added to farming profits of rice growers in Chhattisgarh by over 4½ lakhs in the year under report.

8. The highest yield obtained was one of 4,500 lbs. of paddy from a crop transplanted Gurmatia in Arjunda village The average yield of the 54 transplanted plots was 2,625 lbs and of the *biasi* 1,644 lbs.; these yields are distinctly good. Out-turns in this Division, where the department had from the first demonstrated the transplanting of "singles", will compare very favourably with those obtained in the rice tract in Nagpur Division, where the seedlings are planted out in bunches.

9. With the view of widening the interest of the leading cultivators in the work of transplantation, a batch of 35 malguzars and tenants from Raipur, Bilaspur and Drug districts was taken by Rai Saheb Tundilal Powar, Divisional Superintendent of Agriculture, to Bhandara and Balaghat districts in the month of August, when the work of transplantation there was in full swing. They visited 9 villages, discussed different points in connection with transplantation with the cultivators and returned to their own villages convinced in that minds their transplantation was far superior to a broadcast system of rice cultivation.

10. The irrigation of wheat and the cultivation of cane were out of the question in the year under report. Owing to shortage of water in the tanks, cane-growers experienced some difficulty after the rains in saving their standing cane and no cane could be planted this year. It is futile to encourage cultivators to grow cane under exising Government tanks in this Division. A year like that under report comes as a set-back to years of successful efforts. The cultivation of the crop has had to be given up for a year; if its cultivation is to be taken up again, the difficulty of getting seed, an expensive item, will have to be considered.

11. For the Government Cattle Breeding Farm opened last year in Chandkhuri the Department got enough water during the cold and early hot weather to produce very good crops of clover and *juar*, two green fodders of the first order.

The cultivation of fodder crops under Government tanks is a new enterprise which may help to solve the cattle problem in Chhattisgarh.

The Department is much indebted to the three Deputy Commissioners of this Division, each of whom not only took a keen personal interest in the work of transplantation, but also encouraged their Tahsildars to a like enthusiasm. Abdur Rahman, Additional Tahsildar, Drug, and Krishna Sewak, Tahsildar of Janjgir Tahsil, did excellent work.

Report on Demonstration Work in Berar.

The practice of steeping *juar* with copper sulphate to prevent an attack of smut is now fairly common in Berar and requires no further demonstration. It is hoped that the Agricultural Unions now being established will undertake its sale shortly.

Of the three varieties of *juar*, namely Saoner, Ramkel and Chapti, which have been proved by experiments on the Akola farm to be the most suitable for cultivation in this Division, the first is the most popular; 22,206 lbs. of seed were supplied for sowing during the year under report. All the varieties now being grown on the farm on a big scale for distribution have been propagated from a single head in each case, and continuous selection from the offspring is practised every year on the farm.

In the management of cotton seed farms in this Division, a new step has been taken. Instead of depending entirely on scattered seed farms for the distribution of seed, Co-operative Agricultural Unions have been formed, of which each member has a seed farm, all the seed of which he guarantees to keep pure and to distribute for sowing purposes. To one of the members sufficient selected seed to sow from 25 to 100 acres is supplied from the Government farm: other members of the Union get their supply of seed from this farm. The seed farms belonging to the other members of the Union are designated 'Branch Farms.' Having thus a net-work of seed-producing branch farms fed by a central seed farm formed into a Union, the members of which undertake to co-operate in the ginning, storing and distribution of the seed, much useful work can be done with a minimum amount of supervision by our staff. The Department holds itself wholly responsible for the purity of the seed of the central farm, while the supervision of the branch farms is left to the *lamdar* appointed by the Union, who works under the direct supervision of two of its members designated "Supervisors," whose work in turn is supervised at times by the Department. As this scheme provides for central farms, on which pure and reliable seed can be raised, the demand for seed from Government farms will in future be very considerably reduced. Government seed will be supplied to central farms only: and not necessarily every year to all central farms.

The strain of cotton grown by all the Unions and seed farms is No. 1 Rosea selected on the Akola farm. It has given from 38·5 to 41 per cent of lint at the different seed distribution centres; 1,311,695 lbs. of this strain have this year been distributed in Berar under departmental supervision; while the quantity known to have been distributed by other cotton growers without assistance of any kind from the department amounted to 403,660 lbs. The total quantity of Rosea sown in the cotton tract this year must have been about 2,000,000 lbs.

The owners of seed farms have sent in their reports showing the quantity of Rosea *kapas* and lint obtained, as compared with district outturns.

A summary of this information is given below:—

Serial No.	Name of the district.	Percentage of lint to seed in		Outturn of Rosea on seed farms compared with the district outturn of Jari for the year.		Selling rate of cotton seed per rupee.
		Jari cotton.	Rosea cotton.	Rosea cotton.	Jari cotton.	
1	2	3	4	5	6	7
1	Akola ...	35·60	39·70	345	300	From 14 to 16 lbs.
2	Buldana ...	34·95	39·45	321	301	From 14 to 19 lbs.
3	Amraoti ...	35·57	38·75	394	290	From 18 to 28 lbs.
4	Yeotmal ..	34·70	39·51	340	247	From 12 to 14 lbs.

Rosea has given on an average an increase of about 12 per cent of lint calculated on the lint percentage alone : but its outturn of *kapas* (seed cotton) is also considerably greater than that of Jari.

The seed of Unions and seed farms was sold in the current year at from Rs. 25 to Rs. 46 per khandi of 560 lbs; the bazar rate for cotton seed was only Rs. 14 per khandi, *i e.*, 40 lbs. per rupee. The demand for Rosea at this price was very great; much more could have been sold had it been available. The total area occupied by this variety this year in the whole cotton tract should be about 200,000 acres.

Four Unions have already been registered under the name of Co-operative Agricultural Unions by the Registrar, Co-operative Credit Societies. A statement showing the turnover for the year and profits made is given as Appendix A to this report. In addition to these there were 18 unregistered Unions under trial, of which ten are to be registered shortly. With a view to harmonious working and success, the members selected should be good cultivators as well as good co-operators. As cultivators they can be judged on their merits as such, but as co-operators they have yet to be tested.

The time is ripe for the formation of Agricultural Unions all over Berar, to enable the Department to distribute Rosea seed in every corner of the Division. The people are alive to the importance of growing selected seed, of using improved implements and machinery, and of introducing every improvement that we can offer them. The management of these Unions will be made much easier, when co-operative credit takes deeper root in the Division. The existence of Credit Societies and of men trained in co-operative principles would go far to prepare the ground for this new form of co-operation.

The manurial value of nitrate of soda as a manure for cotton having been proved by experiments carried on for seven years, this manure is now being stocked for sale on the Akola farm. Four tons were sold this year.

Forty-two Turn-wrest ploughs were stocked by the four registered Unions. Sonwadhona Union sold 16, the Paras Union 2 and the Balapur Union 2 ploughs in the year under report. In future, the sale of improved implements and artificial manures and the distribution of agricultural literature, and arrangement for agricultural shows and ploughing matches will be undertaken by these Unions. A very successful ploughing match was held in Khamgaon by the Khamgaon Union in February : 12 improved iron ploughs and 62 local *nagars* competed. The local *nagar* used by well-to-do cultivators is a heavy implement drawn with difficulty by three pairs of strong bullocks. It requires more draught than the iron plough and does less and inferior work. The ploughing match was very well arranged by Mr. K. R. Deshmukh, assisted by Mr. N R Gupte, the Tahsildar. The number of ploughs sold in Berar this year amounted to 240 which is the highest on record ; the aggregate value was Rs 8,460. The success in this direction has been due, in no small degree, to the sales effected by Unions and honorary agents. There are now 22 of these agencies in the cotton tract.

Steps have been taken to extend the area under groundnut in this Division: 5,635 lbs. of seed were distributed in the year under report. This crop does well in Berar: but the damage done to it by wild pigs and the cost of harvesting the nuts in November, when all available labour is required for cotton picking, militate against the rapid extension of the area under it.

The meeting of the Berar Agricultural Associations was exceptionally well attended in the year under review. Steps are being taken to form Taluk Associations and to link them up with the District Agricultural Associations. One Taluk Association was formed in Khamgaon on the initiative of the members of the Agricultural Union formed there a year ago.

The Divisional meeting of the Berar Associations held on the Akola farm in November was largely attended as usual. Over a thousand people were present. A large display of agricultural machinery was shewn at work and

various papers on agricultural problems pertaining to the tract were read and discussed. Three Sub-committees, members of which were mostly drawn from Agricultural Associations and Co-operative Central Banks sat on the day previous to the meeting to consider the following subjects:—

Committee A.—(i) How can Agricultural Unions best be supervised and financed and should the establishment of additional Unions be pushed at present?

(ii) Should the District Staff assist in the distribution of Rosea seed, and if so, in what way?

Committee B.—To examine and report on the existing organisation for the introduction, supply and repair of improved agricultural implements and machinery in Berar and to make recommendations for future guidance.

Committee C.—To report on the exhibits of cotton, *juar* and groundnut exhibited at the Divisional meeting.

The findings of the Committees were as follows:—

Committee A.—1. The Central Bank should be the organizing and controlling agency for Agricultural Unions.

2 The establishment of a Union should not be pushed in a plaee where it is impossible to get the cotton home-ginned, either by a gin belonging to the Union, or by a member of the Union, or by means of hand gins.

3. The Central Bank should charge itself with the supervision of the work of the Unions by means of a special agricultural expert establishment.

4. The cost of this expert staff should be paid at first by the District Board. District Officers should assist the Central Bank with advice as to suitable localities for the establishment of Unions and should explain the objects and methods of the Unions to cultivators when on tour. They should also advise people of the value of Rosea cotton.

5. Action is being taken on these resolutions. Arrangements are being made to get a Union Inspector for the Central Bank of Akola to start with, who, after training on the Akola farm, will be put in charge of his duties as Inspector of the Unions in this district.

Committee B.—Mr. McFarlane of Messrs. Burn and Company explained to the meeting what his firm was willing to do in the way of providing facilities for the supply of machinery and spare parts in Berar. The proposal is to establish a depôt in Akola in charge of a club, thoroughly acquainted with the implements stocked, and a mechanic who would be available to set up and repair machinery anywhere in Berar. He further explained that the retention of the depôt at Akola would depend on the amount of business done.

It was agreed that this scheme would do much to popularize the use of implements.

Action has since been taken on this resolution, the firm having established a depôt on the Akola farm with a clerk and a 3rd class engineer to look after their interests.

Committee C.—Eighty-seven samples of Rosea cotton were sent in for competition. The first prize of Rs. 50 was awarded to Daduram Manuram of Risod; the second prize of Rs. 30 to Janrao Bajirao Deshmukh of Shirala; the third prize of Rs. 25 to Balvant Ramchandra Paranjpe of Chikhali; the fourth prize of Rs. 20 to V. K. Dange of Paratwada, and the fifth prize of Rs. 10 to Kondappa Tukaramappa of Janefal. Their exhibits gave 42·75, 42·08, 41·75, 41·59 and 41·42 per cent respectively of lint to seed.

Buri cotton.—Of Buri cotton there were only seven entries. The first prize of Rs. 20 was awarded to Daduram Manuram of Risod and the second to Gopal Shridhar Deshpande of Chikhli.

Juar.—Forty-six samples of *juar* were sent in for competition. For early varieties, the first prize of Rs. 30 was awarded to Ganpat Bapuji Patel of Alegaon. For medium varieties the first prize of Rs. 20 was given to Gulam Ahmadkhan of Pimpalgaon Raja.

Groundnut.—Seven exhibitors competed in this class. The prizes awarded were as follows :—

Equal ... { 1st prize P. R. Deshpande of Sindi, of Rs. 15.
{ 1 prize Gulam Ahmadkhan of Pipalgaon Raja, of Rs. 15.

3rd prize Rs. 5, to Mr. Gopal Shridhar Deshpande of Chikhli.

Medals and sanads for good work done in agriculture were granted to the persons named below. These were given out at the meeting by the Commissioner :—

Medal.

(1) Mr. Kesho Rao Janrao Deshmukh of Khamgaon.

Sanads.

(1) Rao Bahadur Bhagwantrao Deshmukh of Daryapur.
(2) Mr. Janrao Bajirao Deshmukh of Sirala.
(3) Mr. Mahadeo Prasad of Pathrot.
(4) Mr. Bajirao Yeshwantrao Deshmukh of Bangaon.
(5) Mr. Gulabrao Narayanrao Deshmukh of Matergaon.
(6) Mr. Zingaji Lakshman Teli, of Garadgaon.
(7) Mr. Hasanrao Ganpatrao Deshmukh of Garadgaon.
(8) Mr. Govind Balwant Patwari of Batwadi.
(9) Khan Bahadur H. M. Malak of Nagpur.
(10) Mr. Sadashi Amrit Buti of Bori.
(11) Mr. Anandrao Meghe of Borgaon.

Wild animals.—Two more bulls belonging to the Sagoda herd were captured in June. Owing to shortage of staff and to pressure of work, it was not possible to devote time to the capture of the remainder of this wild herd. There are still about 25 animals to be accounted for.

Much assistance has been given to the Department during the year by the Revenue Department. We are specially indebted to Mr. Chapman, the Deputy Commissioner of Yeotmal, and Mr. Jatar, the Deputy Commissioner of Buldana. Mr. N. R. Gupte, Tahsildar, Khamgaon, Mr. N. G. Deshpande, Tahsildar, Ellichpur, Mr. Sanjana of Mehkar, and Mr. Mir Taslim Husain of Darwah did much to help the Department in the sale of Rosea seed belonging to Agricultural Unions and seed farms.

D. CLOUSTON.

Deputy Director of Agriculture,

Southern Circle, Central Provinces.

APPENDIX A.

Serial No.	Name of Union.	No. of members.	Area under Union (in acres.)	Quantity of seed produced (in lbs.).	Quantity of seed sold (in lbs).	Quantity of seed left unsold (in lbs).	Rate at which the seed was sold.	Account of profits derived by sale of Rosea seed.				Profits derived by sale of implements.		Total profit (total of columns 12 and 14).	Remarks.
								Sale-proceeds of the quantity of seed shown in column 6 at the rate shown in column 8.	Estimated value of the quantity of seed shown in column 6 at 20 lbs per rupee—the average bazar rate.	Expenditure t wards the pay of Kamdar, storage, &c.	Profit made by sale of seed (difference between the amount shown in column 9 and the total of columns 10 and 11.)	No. of implements sold.	Profit earned by sale of these implements.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
								Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.	
1	Gaigaon ...	18	609	65,694	65,694	...	There was no fixed rate all through. It varied from 16 to 20 lbs. per rupee.	3,218 9 0	1,642 6 0	138 12 0	1,437 7 0	...	...	1,437 7 0	
2	Paras ..	12	360	40,011	40,011	...	At Rs. 8 per 70 seers.	2,286 5 0	1,000 4 0	19 1 0	1 267 0 0	2 T.-W. ploughs.	8 0 0	1,275 0 0	
3	Balapur ...	15	268	21,600	20,360	1,284	At Re. 1 per 10 seers.	1,015 13 0	507 14 0	96 0 0	411 15 0	Do.	8 0 0	419 15 0	
4	Sonwadhona ...	56	1,441	84,160	81,360	2,800	Rate partly at Rs. 35 per khandi and partly at Rs. 40 per khandi of 560 lbs.	6,069 12 0	2 184 0 0	310 0 0	3 575 12 0	16 T.-W. ploughs.	64 0 0	3,630 12 0	

Demonstration work in Nagpur Division.

The four crops which received the attention of the demonstration staff of this Department working in areas under Government tanks in Nagpur Division were rice, cane, groundnut and cotton. The cultivation of rice being already thoroughly understood, the aim of the Department in this Division is to make rice-growing more profitable by encouraging the cultivation of heavy-yielding varieties and by discouraging the wasteful method of transplanting bunches instead of single plants. In Chhattisgarh, where the transplantation of rice has been introduced by the Department, single seedlings are as a rule used; pairs are only put in when the seedlings are weak. An area of 30,000 acres was transplanted there by this method last year. In Nagpur Division transplantation is already practised, but the transplanter plants out bunches of from 4 to 8 seedlings, and his acreage seed rate is about 100 lbs. of paddy per acre, as against 25 lbs. used in Chhattisgarh. There is thus a saving of about 75 lbs. of paddy per acre by the single seedling method which we are demonstrating. In Bhandara district under Chandpur and Khairbandha tanks the cultivators were induced to adopt this method over an area of 210 acres.

Under Asola-Mendha and Ghorajheri tanks in Chanda district still better progress was made: 2,250 acres in all having been transplanted with 'singles' under the supervision of the two Agricultural Assistants stationed there.

From experiments carried out on the Raipur farm it has been proved that the Gurmatia rice grown there is the heaviest yielder under trial. Selected seed of this rice has now been distributed for two years in Chanda district, where it was not previously known, but where it has now become a distinctly popular variety in the villages. Sixteen thousand five hundred pounds of this variety were sold for seed purpose from the Sindewahi Experimental Farm this year.

The efforts being made by the Department to introduce and extend cane cultivation under Government tanks have not in the year under report been crowned with success. In Chanda district cane cultivation is already practised but the outturns are very small, as the variety mostly grown is a hard thin reed-like cane which is both poor in quality and poor as a yielder too. The quantity of manure applied is small: and the grower is satisfied with an outturn of about 10 tons of cane per acre. The Department has distributed a large quantity of seed of cane of high quality in the district. Twenty-nine thousand whole canes were supplied in the year under report. The variety which has found most favour is Sannabille, a hard cane of medium thickness and of good quality. It is hardy, too, and will in course of time replace Katai, the local variety. Owing to leakage in the channels of Ghorajheri tank it was not possible for the Irrigation Department to supply sufficient water for this crop in the hot weather. The thick varieties, the seed of which had been obtained from our Department, fared worse than the hardier local cane: but the amount of damage done was not very serious. Under Ramtek the crop fared much worse owing to irregularity in irrigation and other reasons. Cane cultivation has received a decided set-back under this tank and the area planted this year has declined by about 43 per cent in consequence, the area this year being only 125 acres against 218 last year. This is to be regretted, as the demonstration work of the previous two years had proved that cane cultivation, if properly supervised by our Department, could be grown at a handsome profit: in the year under report our staff at work under Ramtek tank failed to justify their existence. To the cultivators under this tank cane is a new crop, and ignorant as they are of its water and manurial requirements they have evidently neglected it very badly in the hot weather, as much of the crop had attained a height of two feet only. The bulk of the cake which should have been applied in May was fed to their hungry bullocks instead, and their cane was left uncared for. Most cultivators attribute the failure of their crop to want of irrigation in the hot weather to its having been grazed down by stray cattle, or to their soil being poor. Much damage was no doubt done by stray cattle: the attention of the Deputy Commissioner was drawn to this. The soils of the tahsil are mostly light: unless highly manured they give poor yields of cane. It is not surprising, therefore, if the condition of their bullocks was better than that of their cane in villages in

which this crop was grown last year. The present system by which water is distributed under Government tanks generally is no doubt quite unsuited to the conditions existing here where the cultivators are ignorant of the quantity of water required for cane, and where they seldom ask for water till somebody draws their attention to the fact that their crop is withering for want of it. The whole question has been gone into with the Superintending Engineer and Executive Engineer in charge, and on my suggestion a definite system of irrigation has been adopted. Each cane-growing village now gets water regularly once a week. If the growers fail to apply the water when it is running in their village minor, the fault is theirs. The introduction of this system, while lessening the work and worry of the Irrigation Department, will go far to guarantee the success of cane-cultivation in this tahsil in future. From experience I can say that it has worked very well up to date. The task in front of the two Departments under this tank is a formidable one. The cultivators are poor and stiff-necked and the villages are mostly owned by absentee malguzars. Under Chandpur and Khairbandha tanks in Bhandara district, an area of 107 acres was planted. Here, too, the crop suffered owing to insufficiency of water after the rains: the water having been required for rice.

Groundnut grown under irrigation did well in Chanda. Seed was distributed by the Sindewahi Farm: outturns amounting to 2,300 lbs. were reported. Both cane and groundnut are much damaged in this Division by wild pig. The introduction of pig-proof woven wire-fencing by the Department has proved a great boon to those cultivators who have already got their fields fenced with it.

The irrigated cottons grown on the Sindewahi Farm have given such good results for the last two years that arrangements have been made this year for the distribution of Cambodia and Rosea seed, most of which is to be sown under Asola-Mendha tank. Sufficient seed to sow 150 acres has been supplied to cultivators under Asola-Mendha alone. Yields ranging from 900 to 1,200 lbs. of *kapas* were obtained on the Sindewahi Farm this year: if the cultivator can get half these outturns, the crop will pay him very much better than any crop he grows at present with the exception perhaps of sugar cane.

The Department has during this year given Mr. McGlashan, who is starting a sugarcane estate under Ghorajheri tank, every assistance possible both in the way of giving advice and of supplying the seed for the cane and cotton areas which he has planted this year. The Department on the other hand is much indebted to him for valuable expert advice on technical subjects pertaining to the manufacture of *gur*.

Report on the Sullage Farm, Wardha.

Experiments carried out on an area of one acre forming part of the land acquired by the Municipality of Wardha, on which to run the sullage water of the new drainage scheme, give some indication of the manurial value of this drainage water. Three crops were raised one after the other in a period of 14 months. Maize and *juar* sown as hot-weather crops were followed by groundnut, cabbage, cauliflower, chillies and clover. These again were followed by maize and *juar* in March and April.

These crops grew luxuriantly. Clover yielded 26,784 lbs. per acre. The outturns and their values are given in the statement below :—

Name of crop.	Date of sowing.	Area occupied by the crop.	Value of the produce per acre.	Cost of cultivation per acre.	Profit or loss + or — per acre.	Remarks.
		1ST CROP.				
			Rs. a. p.	Rs.	Rs. a. p.	
Maize ...	12th May 1913.	½ acre.	156 0 0	24	+132 0 0	
Juar for fodder ...	21st May 1913	⅛ „	138 0 0	24	+114 0 0	

Name of crop.	Date of sowing.	Area occupied by the crop.	Value of the produce per acre.	Cost of cultivation per acre.	Profit or loss + or — per acre.	Remarks.
		2ND CROP.				
			Rs. a. p.	Rs.	Rs. p. p.	
Groundnuts ...	25th September 1913.	½ acre.	36 9 0	18	+ 18 9 0	Sown after the removal of maize crop.
Early chillies ...	30th September 1913.	½ „	12 15 0	12	+ 0 15 0	
Cabbage and cauliflowers...	21st October 1913.	½ „	240 0 0	72	+168 0 0	Sown after the removal of *juar* crop.
Clover ...	5th November 1913.	½ „	156 0 0	36	+120 0 0	
		3RD CROP.				
Maize ...	30th March 1914.	½ acre.	3 4 6	24	— 20 11 6	After the removal of groundnuts and chillies.
Juar for fodder ...	9th April 1914...	½ „	74 4 0	24	+ 50 4 0	After the removal of cabbage.

Maize sown in May followed by cabbage, cauliflower or clover in the beginning of the cold weather, and by juar again in the succeeding hot weather is a system of cropping which may be depended on to give a large net profit on a sullage farm of this kind. The aggregate net profit in this experiment amounted to Rs. 350 per acre. The produce was all disposed of locally.

Implement Depôts.

The increased sale of ploughs is due to their now being stocked at one or more places in each district of the cotton tract. The number sold during the year is the highest on record. Eight oil-engines were set up on seed farms for the ginning of pure Rosea seed grown thereon. The type of engines selected is the "Gardner." Two *mistris* trained in driving this engine and in setting up gins. have been employed by this Department to set up new plants and to execute repairs. There are now over 24 of these small ginning plants at work in Berar alone. In some cases the oil-engines are used for driving fodder cutters and small flour mills as well as gins.

Juar karbi was cheaper and more plentiful during the year under report, and the demand for fodder-cutters was less in consequence.

For the Akola bullock hoe the demand was as usual good.

Forty-four iron cane mills were sold, most of these were taken by cane-growers in Chanda district, who also purchased most of the patent pig fencing. The type of patent fencing stocked was No. 1150 Ideal. It serves its purpose very well as a fence, where crops have to be protected against wild pig and stray cattle.

The iron cart wheel designed by Mr. Cove has been tried and found satisfactory. Arrangements are being made to get a firm to take up the manufacture of these.

Seven different types of iron ploughs manufactured by Rudolf Sack, a German firm, were tried, two of which did very good work and are to be given further trial.*

A *juar* reaper designed by Messrs. A. C. Bamlett & Co., Thirsk, Yorkshire, England, on my advice was received in January but too late for trial. It will be tested in the current year.

The value of the machines and implements sold during the year amounted to Rs. 42,382-13-0.

* *N. B.*—This was written before the outbreak of war.

C. E. Low.

Statement showing the number of implements disposed of during the year 1913-14 in Southern Circle.

Name of implement.	Number sold.	Value.
		Rs. a. p.
Sugarcane mills of Nahan Foundry	29	3,712 1 4
Burn and Company's 3-roller cane mills	16	1,164 0 0
Burn and Company's 2-roller cane mills	2	88 0 0
Gur boiling pans	3	120 0 0
Perfection sprayer	1	0 4 0
Brass bucket spray pumps	3	21 0 0
Chain pumps	3	250 0 0
Reflector Tubular Lanterns	4	8 0 0
Safety Mill Lanterns	2	7 1 5
Iron casting for winnowers	2½ sets.	50 5 10
Wire cloth for winnowers	4⅜ sets.	32 0 0
American winnowers	2	223 2 2
Akola winnowers	1	45 0 0
Burn and Company's iron winnowing machine	2	240 0 6
Pig fencing, Ideal and Page's	5,160 yards.	2,453 8 0
Wolverine feed cutters	3	60 0 0
Chaff cutter	1	12 6 2
Fodder cutters	30	4,159 14 1
Hand fodder cutters	9	108 0 0
Spare knives for fodder cutters	4	12 6 4
Spur wheel gear	1	96 3 8
Bullock gear	1	100 0 0
Large Turn-wrest ploughs	220	8,360 0 0
Medium Turn-wrest ploughs	15	390 0 0
Small Turn-wrest ploughs	31	682 0 0
Spare shares for large Turn-wrest ploughs	24	33 0 0
Watt's plough	1	9 8 0
Akola hoes	100	380 0 0
Gins	17	4,520 0 0
Oil-engines	9	14,800 0 0
Intermediate motions	7	295 0 0
Total ...	...	42,382 13 0

Report on the work of Mr. Ratiram Khamparia, Assistant Entomologist.

Hairy caterpillars on plantains, *brinjals*, maize, &c., leaf-rollers on bamboo, maize and cotton, sugarcane borers, cotton boll-worm, cotton aphis and cotton mealy, bug, tobacco stemborer, surface caterpillars attacking clover, and cattle ticks were the chief crop and animal pests investigated during the year.

The use of *bhendi* as a trap crop for cotton boll-worm was again tested. Three plots of cotton each $\frac{1}{10}$th acre were selected $\frac{1}{4}$th of a mile apart. Plots I and II were sown with *bhendi* and cotton, and plot III with cotton only. In Plot I, from which all the pods of *bhendi* were removed at regular intervals, 5 per cent of the bolls were affected by the boll-worm. In plot II, in which the *bhendi* pods were allowed to mature and were not removed at all, over 20 per cent of the bolls were affected. In plot III, in which there was no *bhendi*, 10 per cent of the bolls were affected. It would appear therefore that (*i*) the damage done by boll-worm can be reduced by growing *bhendi* as a trap crop along with cotton, and (*ii*) that where the pods of *bhendi* are allowed to mature, the pest is increased and the cotton is damaged thereby.

One field of clover was badly attacked by a surface caterpillar The Assistant Entomologist, who was asked to suggest a remedy, advised that the field be irrigated, so as to drive the pest above ground. This was done and proved effective. Hundreds of birds attracted from the neighbouring jungle were verily "in clover" for days, feasting to their heart's content. The Assistant Entomologist reckons that they accounted for the death of 20,000 caterpillars.

To destroy ticks on the cattle of Telinkheri Breeding and Dairy Farms, kerosene emulsion was first tried, but was not successful except when a very strong emulsion was used. Cocoanut oil and common salt, castor oil and soda bicarbonate, formalin, Cooper's dip and some other insecticides were tried. Formalin, though effective in killing ticks, is too expensive to be used on a large scale. The best dip tested was a mixture of kerosene emulsion containing 10 per cent of kerosene and Cooper's dip—2 lbs. of the dip to 25 gallons of water.

The Assistant Entomologist attended gatherings of cultivators at Bhiwapur, Raipur, Nagpur, Sindewahi, Akola, Wardha, Powarkheda and Burhanpur and demonstrated the use of the 'bag' for catching locusts, poisoned bait for caterpillars, light traps and parasites for caterpillars. Leaflets written by the Entomologist on the pests of cotton and juar and on gram pod borer were distributed widely at these meetings and lectures were delivered on the pests common to each of these localities. Show cases giving briefly the life history of the chief crop pests and remedies for dealing with them, were prepared for the use of Government farms.

The Assistant Entomologist has done a considerable amount of touring during the year, in connection more especially with cane, cotton and rice pests. Many specimens of insects and of parasites on insects have, as usual, been sent to the Imperial Entomologist for identification; many of these had, I understand, not been found in these Provinces before.

Mr. Ratiram Khamparia continues to take a keen and intelligent interest in his work.

D. CLOUSTON,

Deputy Director of Agriculture,

Southern Circle, Central Provinces.

TELINKHERI DAIRY FARM

HAY & GRAZING AREA

Scale 660 = 1 inch

Annual Report on Government Agricultural Station, Powarkhera, Hoshangabad, for the year 1913-14, by G. Evans, Esq., M. A., Deputy Director of Agriculture, Northern Circle, Central Provinces.

I.—General.

This station was opened in 1903, but owing to the unsuitability of part of the land originally acquired for experimental purposes, the area was extended in 1906, so as to include a piece of level black land to the south, typical of the wheat soil of this part of the Nerbudda valley. In 1912 a further area of 34·19 acres of inferior land, much cut up by *nalas*, was acquired and was put down to grass, as the grazing area was insufficient. The Cattle Breeding Farm adjoins the Experimental Farm proper, and the whole forms a compact block of 520·76 acres which is made up as follows:—

	Acres.
Arable land	250·74
Grazing area	188·51
Grass reserve	74·04
Roads and buildings	7·47
Total ...	520·76

Part of the grass reserve has gradually become infested with coarse grasses and bushes and has consequently been thrown open to grazing, while a corresponding area of the grazing land has been enclosed for hay.

Situation.

This Farm is situated close to the small village of Powarkhera in the tahsil and district of Hoshangabad. It is bisected by the high road which connects Itarsi with Hoshangabad, being seven miles from the former and four miles from the latter town. The nearest railway station is Byaora on the Indian Midland Section of the Great Indian Peninsula Railway, which is two miles from the Farm by metalled road. The land is fairly representative of the black wheat soils of the Nerbudda valley.

The soil consists of two kinds of black wheat land differing only in degree and known as *maryar* and *morand II*, respectively. The latter is of lighter texture, and can grow kharif crops. An analysis of a sample of the former soil, made by Mr. Plymen, the Agricultural Chemist, is given below. In places it is more than 13 feet deep.

Analysis of *maryar* soil from Powarkhera:—

	Acres.
Coarse sand	3·78
Fine sand	9·43
Silt	16·78
Fine silt	21·50
Clay	34·00
Loss on ignition	6·20
Moisture	5·10
Calc. carbonate	1·05
Soluble in dilute acid	2·16
Total ...	100·00

The main crops of the district are *rabi*, and the Farm is primarily intended for experiments with wheat and other winter crops.

Damage by wild Animals.

The crops in this neighbourhood are very liable to damage by wild animals. Wild pig come down from the hills at the end of the rains and abound until wheat harvest. In spite of the constant watching it is almost impossible to keep them away from such crops as cane and groundnuts, which are particularly relished, and are only sparingly grown in the neighbourhood.

Antelope are not so common as formerly and do comparatively little harm; but parrots, coolan and geese cause much injury at times to the grain crops.

Improvements.

The grass area obtained in 1912-13 has received much attention. Many stumps and bushes have been removed and a large area can now be cut by mowing machine. *Kans* patches were ploughed out during the hot weather.

The water trough and tanks were raised 2 feet so that a larger area of land is commanded by the oil-engine pumping plant

Climate.

The climate on the whole is more agreeable than in the south of the Provinces. The Nerbudda valley is here about 1,000 feet above the sea level and although frosts are rare the hot weather is by no means a long one.

The following table represents the temperatures determined at Hoshangabad by the Jail authorities :—

Month.	Average maximum.	Average minimum.	Absolute maximum.	Absolute minimum.
January	80·3	52·3	91·0	40·0
May	107·6	80·3	117·1	60·5
July	86·7	72·2	106·4	70·0

Character of the Season.

The total rainfall during the year amounted to 48·56 inches, the average on this Farm for the last nine years being 39·90 inches.

The monsoon set in on June 2nd and the kharif sowings were completed by June 23rd, an exceptionally early date. A long break followed until the middle of July, and some resowing was necessary, drought and caterpillars doing some damage. Heavy rain followed and retarded the growth of *kharif* somewhat, while it interfered with the proper cultivation of *rabi* land.

The monsoon ceased abruptly at the beginning of September, but a local storm gave providential rain on 11th and 12th September, and for this reason the crops in the small area round the Farm were better than in the rest of the district where the *rabi* crop as a whole was bad.

Rabi sowings were finished early and much withering was observed by the exceptional heat of November. A shower in the middle of December improved matters however, and the *rabi* crop recovered greatly.

A hailstorm early in March, which totally destroyed the crops in ninety villages to the south of the Farm, did comparatively little damage on the Farm, but the heavy showers which fell about this time did some damage to the gram which was then on the threshing floor.

The *rabi* crop was a fair one on the whole, but was not, of course, nearly so good as last year. The *kharif* crop was moderate, and the hay crop a light one but of excellent quality.

The following table compares the rainfall with the average of last nine years :—

Month.	No. of rainy days.	Rainfall during 1913-14.	Average rainfall of last 9 years.
1	2	3	4
1913, June ... 1st half	4	2·01	0·99
1913, June ... 2nd „	7	3·14	3·78
July ... 1st „	5	3·05	6·47
July ... 2nd „	10	12·99	6·89
August ... 1st „	5	12·76	6·88
August ... 2nd „	6	6·32	5·08
September 1st „	6	5·20	5·10
September 2nd „	...	...	2·67
October 1st „	...	...	0·16
October 2nd „	...	...	0·01
November 1st „	...	...	0·22
November 2nd „	...	...	0·29
December 1st „	2	1·44	0·24
December 2nd „	...	...	0·13
1914, January 1st „	...	...	0·08
1914, January 2nd „	...	...	...
February 1st „	...	...	0·18
February 2nd „	...	...	0·06
March ... 1st „	2	1·60	0·20
March ... 2nd „	...	...	0·14
April ... 1st „	...	0·05	0·13
April ... 2nd „	...	...	...
May ... 1st „	...	...	...
May ... 2nd „	...	...	...
Total ...	47	48·56	39·90

STAFF.

The Farm was in charge of Govind Prasad throughout the year, and he has performed his duties conscientiously and well, and has been well supported by his somewhat slender staff. The Divisional Agricultural Conference was held this year in the middle of February, and was attended by the District Staff, officials from Indore and Bhopal States, the Registrar, Co-operative Societies, and by a large number of other visitors.

II.—Experimental Series.

SERIES A.—To test the effect of different manures on wheat grown continuously with irrigation.

Area of each plot ·20 acre. Variety—Sukerhai Pissi.

No. of Plots.	Treatment.	Outturn per acre. 1912-13.		Outturn per acre 1913-14.		Cost of cultivation per acre.	Value realized per acre.	Profit per acre.	Remarks.
		Grain.	Other.	Grain.	Other.				
1	2	3	4	5	6	7	8	9	10
		lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	Unmanured ...	992	1,157	967	802	15 5 0	51 15 8	36 10 8	Regular.
2	Saltpetre=20 lbs. Nitrogen per acre top-dressed.	1,079	1,062	1,207	1,042	40 13 9	65 5 0	24 7 3	Do.
3	Ammonium Sulphate=20 lbs. Nitrogen per acre mixed with seed before sowing.	1,176	1,125	1,077	967	29 2 8	58 10 9	29 8 1	Do.
4	Oilcake=20 lbs. Nitrogen per acre applied in rains.	1,019	1,225	885	870	30 10 5	48 14 11	18 4 6	Hapkans.
5	Farm yard manure=20 lbs Nitrogen per acre applied in the beginning of rains.	1,217	1,147	1,112	892	19 15 2	59 8 1	39 8 11	Regular.
6	*Makua* refuse applied in the beginning of rains.	1,150	1,045	1,027	967	18 7 10	56 6 1	37 14 3	Do.
7	Green soiled with *san*, 100 lbs. seed sown per acre.	1,150	1,260	857	832	22 14 8	47 5 1	24 6 5	Germination rather irregular.
8	Green soiled with *tarota* (cassia), 100 maunds per acre.	1,270	1,167	905	835	22 3 5	49 8 1	27 4 8	Do.

The use of artificial nitrogenous manures has again not paid, although increased yields have been obtained. Green soiling has again done badly, and owing to the difficulty of ploughing in at the right time on these heavy soils is not likely to prove a reliable practice.

SERIES E.—Effect of rotation with wheat as the principal crop.

Area of each plot ·20 acre.

Number of plot.	Treatment.	Outturn per acre.														Cost of cultivation per acre.	Value realized per acre.
		1909-10.			1910-11.		1911-12.			1912-13			1913-14.				
		Crop.	Grain.	Other.	Crop.	Grain.	Crop.	Grain.	Other.	Crop.	Grain.	Other.	Crop.	Grain.	Other.		
1	2	3	4	5	6	7	9	10	11	12	13	14	15	16	17	18	19
			Lbs.	Lbs.		Lbs.		Lbs.	Lbs.		Lbs.	Lbs.		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
1	Light dressing of farm yard manure. 40 lbs. Nitrogen per acre every third year when wheat is grown.	Wheat ...	586	781	Wheat ...	850	Wheat ...	1,137	1,360	Wheat ...	1,334 *	1,310	Wheat ...	940	895	10 7 1	51 11 1
2		Gram ..	930	854	Do. ...	1,045	Gram ...	895	827	Do. ...	1,497	1,707	Gram ...	841	645	8 1 7	41 8 2
3		Wheat ..	485	788	Gram ...	780	Wheat ..	1,137	1,397	Gram ...	1,095	1,020	Wheat ...	1,265	1,160	19 10 7	69 1 5
4		*Teora* ..	323	738	Wheat ..	990	*Teora* ..	1,195	1,187	Wheat ...	1,472	1,710	*Teora* ...	1,229	921	7 8 10	50 2 6
5		Wheat ...	580	838	*Teora* ..	840 *	Wheat ...	1,350	1,567	*Teora* ...	1,365	1,497	Wheat ...	1,327	1,165	19 11 10	71 15 8
6		Do ...	495	873	Wheat ...	760	Do ..	815	1,402	Wheat ...	1,046	1,187	Do. ...	755	667	9 7 8	50 11 8
		Gram ...	159		Gram ...	113	Gram ...	270		Gram ...	135		Gram ...	187	192		
7		*Rabi* . *Til.*	178	...	Wheat ...	865	Linseed ..	170	725	Wheat ...	1,220	1,365	Linseed ...	470	640	6 8 2	29 5 2
8		Wheat ...	693	888	Linseed ...	475	Wheat ...	1,060	1,160	Linseed ...	570	957	Wheat ...	955	897	19 3 1	52 6 4
*9		*Urid* ...	...	...	Wheat ...	775	*Masur* ...	185	422	Wheat ..	1,272	1,337	*Masur* ...	284	461	6 5 3	16 6 11
10		Wheat ...	615	845	*Masur* ..	130	Wheat ...	1,280	1,555	*Masur* ...	967	1,167	Wheat ...	1,102	1,080	19 9 10	60 14 7
11		Do. ...	535	850	Wheat ...	630	Do. ..	1,050	1,345	Wheat ...	815	1,060	Do. ..	805	785	9 5 7	46 11 1
		Linseed..	48		Linseed ...	150	Linseed ..	10		Gram ...	167		Linseed ...	37	37		

* Plot No. 9 has much Kans.

The increased yields of wheat due to rotation with a pulse crop are very spparent.

SERIES H.—Effect on wheat grown continuously of different quantities of seed and different methods of sowing.

Number of plot.	Treatment.	Outturn per acre. 1910-11. Crop.	Grain.	Other.	1911-12. Crop.	Grain.	Other.	1912-13. Crop.	Grain.	Other.	1913-14. Crop.	Grain.	Other.	Cost of cultivation per acre.	Value realized per acre.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			lbs.	lbs.		lbs.	lbs.		lbs.	lbs.		lbs.	lbs.	Rs. a. p.	Rs. a. p.
Sown with country plough. 1	80 lbs. seed per acre.	Wheat.	650	685	Wheat.	515	567	Wheat.	924	855	Wheat.	852	750	17 14 3	46 4 0
Sown with country plough. 2	100 lbs. seed per acre.	Do.	690	668	Do.	434	557	Do.	946	875	Do.	787	705	18 10 1	42 13 4
Sown with drill. 3	80 lbs. seed per acre.	Do.	651	665	Do.	344	601	Do.	974	934	Do.	835	822	17 4 5	46 2 11
Sown with drill. 4	100 lbs. seed per acre.	Do.	660	665	Do.	395	591	Do.	920	902	Do.	897	650	18 5 4	47 4 7

This series will probably be discontinued next year.

SERIES M (*a*) AND M (*b*).—Effect of different manures on cotton grown in rotation with *juar* and *tur* and sown with drill and broadcast. Manure to be applied only in the year in which cotton is grown.

Area of each plot ·20 acre.

Treatment—M (*a*) 1. Unmanured.

2. Farm yard manure 40 lbs. nitrogen per acre.

3. " " " 20 " " "

4. Nitre 20 lbs. nitrogen per acre.

5. Nitre 10 " " "
Ammonium sulphate 10 lbs. nitrogen per acre.

6. " " 20 " " "

M (*b*) 1 to 6. Same as above M (*a*), but seed sown broadcast.

Number of plot.	Treatment.	Crop.	M (a) Sown with drill.							M (b) Sown broadcast.						
			Average of cotton for last four years excluding 1912-13.	1911-12.		1912-13.	1913-14.	Cost of cultivation per acre.	Value realized per acre.	Average of cotton for past 4 years excluding 1912-13.	1911-12.		1912-13.	1913-14.	Cost of cultivation per acre.	Value realized per acre.
				Outturn per acre *juar* and *tur*.		Outturn per acre cotton.	Outturn per acre cotton followed after cotton.				Outturn per acre *juar* and *tur*.		Outturn per acre cotton.	Outturn per acre cotton followed after cotton.		
				Grain.	Other.						Grain.	Other.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	Effect of different manures on cotton, *juar* and *tur* in rotation sown with drill. No manure has been applied this year; the results of the residues have been observed for cotton.	Cotton ...	345	...	...	525	347	13 13 3	28 15 4	390	...	...	362	266	17 10 6	22 3 0
		Juar ...	...	485	2,900	...	...	...	...	...	362	2,057	...	...	...	...
		Tur ...	..	78	288	...	...	...	...	...	247	420	...	...	...	...
2		Cotton ..	445	...	...	662	539	15 9 7	44 14 4	401	...	...	517	225	17 14 8	18 12 0
		Juar ...	...	780	3,987	...	...	...	...	...	410	1,985	...	...	...	...
		Tur ...	...	85	230	...	...	...	...	...	182	332	...	...	...	...
3		Cotton ...	366	...	...	597	524	15 7 6	43 10 4	378	...	...	442	219	20 7 1	18 3 8
		Juar ...	...	797	3,760	...	..	...	...	...	605	2,575	...	...	...	...
		Tur ...	...	95	226	...	...	...	...	...	150	350	...	...	...	...
4		Cotton ...	477	...	...	600	454	14 13 11	37 13 0	418	...	...	332	187	20 2 6	15 10 0
		Juar ...	...	630	3,130	...	...	...	...	...	487	1,925	...	...	...	...
		Tur ...	...	122	315	...	...	...	...	...	137	297	...	...	...	...
5		Cotton ...	484	...	...	654	432	14 10 7	36 0 8	463	...	...	425	202	20 4 7	16 14 0
		Juar ...	...	640	2,630	...	...	...	...	...	460	2,352	...	...	...	...
		Tur ...	...	205	417	...	...	...	...	...	180	385	...	...	...	...
6		Cotton ..	415	...	...	671	410	14 7 8	34 2 8	372	...	...	432	216	20 6 8	18 0 4
		Juar ...	...	687	3,790	...	...	...	...	...	645	2,520	...	...	...	...
		Tur ...	...	170	377	...	...	...	...	...	167	407	...	...	...	...

In the year under report there was a striking difference in the appearance of the crops in the two series. The drilled series was better in every respect and owing to the high price of hand labour for weeding in the broadcast series, the profits per acre were also much larger. Farm yard manure has given the best results.

SERIES N.—Rotation experiments with *kharif* crops.

Area of each plot ·20 acre.

Number of plot.	Treatment.	Crop.	Outturn per acre. 1909-10. Grain.	1909-10. Other.	1910-11. Grain.	1910-11. Other.	1911-12. Grain.	1911-12. Other.	1912-13. Grain.	1912-13. Other.	1913-14. Grain.	1913-14. Other.	Cost of cultivation per acre.	Value realized per acre.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	To be manured with farm yard manure 40 lbs nitrogen per acre every other year (except in plot No. 4) in which cotton is sown.	Cotton	230	...	65	...	65	...	197	...	220	...	...	...
		Tur	371	354	540	815	300	577	350	480	415	Bhusa ... 381 Stalks... 671	19 15 7	39 7 0
2		Cotton	...	...	50	...	...	...	352	...	...	..		
		Tur	...	...	665	950	...	...	315	466	...	...	6 14 10	48 12 3
3		Juar	1,431	6,989	...	1,025	...	4,365	...	492	675	3,140		
		Tur	...	...	835	...	...	...	277	...	...	...	8 7 10	78 4 10
		Cotton	...	...	35	...	810	4,360	412	...	1,292	3,391		
4		Juar	1,200	8,565	...	...	5	7	...	...	20	70		
		Urid	3	0	93	...	...	...	557	...	...	...		
		Cotton	...	...	...	...	...	3,355	...	...	940	...	7 5 11	58 1 1
5		Juar	1,135	6,145	93	...	770	3,867	736	...	1,280	2,795		
		Cotton	...	...	...	...	...	...	...	...	...	3,365	8 1 2	74 13 6
6		Juar	1,362	7,308	158	...	975	3,867	399	...	1,280	...		
		Cotton	...	...	...	...	...	210	...	...	...	...		
		Sann	Failed.	...	...	...	150	Fibre.	...	...	248	Sann fibre.	34 12 4	44 4 9
							Seed.					2764		
7		Cotton	...	...	95	...	...	...	320	...	...	...		
		Wheat	300	495	...	...	520	590	...	...	707	932	13 2 0	41 7 9
8		Cotton	...	...	118	...	...	...	407	...	...	...		
		Gram	620	580	...	...	540	510	...	...	585	525	8 2 5	29 10 0
9		Cotton	...	...	93	...	...	...	409	...	...	...		
		Wheat	43	638	...	...	327	545	...	...	305	445		
		Gram	325	...	148	...	150	...	...	...	350	450	11 7 4	37 6 4
10		Cotton	...	...	...	...	...	...	415	...	...	...		
		Tur	88	173	...	...	155	225	...	...	100	Bhusa ... 244 Stalks... 82	6 11 11	21 5 3
		Rabi Til	254		...	...	202	410	...	...	147	335		

Pig damaged the crop of plots Nos. 2 and 4.

An irrigation was given to wheat crop of plots Nos. 7 and 9 to save crop from withering. Much damage was done to these plots by white ants.

SERIES S.—To test the quantity of water required for *rabi* in black soil with different methods of irrigation.

Wheat in rotation with gram. Area—·50 acre each plot.

No. of plot.	Treatment.	Outturn per acre.												Cost of cultivation per acre.	Value realized per acre.
		1909-10.				1911-12.				1913-14.					
		Quantity of water in cubic feet.	Crop.	Grain.	Other.	Quantity of water in cubic feet.	Crop.	Grain.	Other.	Quantity of water in cubic feet.	Crop.	Grain.	Other.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
				lbs.	lbs.			lbs.	lbs.			lbs.	lbs.	Rs. a. p.	Rs. a. p.
1	Broad irrigation	11,500	Wheat ..	830	975	5,075	Wheat ...	656	706	6,000	Whaet ...	1,043	1,101	23 3 6	58 6 8
2	*Kiari* irrigation	7,650	Do. ...	900	967	4,725	Do. ...	668	647	5,600	Do. ...	1,035	1,141	24 10 8	61 2 10
3	Long beds	8,200	Do. ...	820	1,007	4,900	Do. ...	729	654	4,800	Do. ...	954	1,046	23 2 10	53 13 2

SERIES T.—To ascertain what quantity of water is most economical
Crop—wheat. Area of

No. of plot.	Treatment 1910-11. Date of irrigation.	Quantity of water in cubic feet per acre.	Outturn per acre. Grain.	Outturn per acre. Other.	Profit per acre.	Treatment 1911-12. Date of irrigation.	Quantity of water in cubic feet per acre.	Outturn per acre. Grain.	Outturn per acre. Other.	Profit per acre.	Treatment Date of irrigation.	Quantity of water in cubic feet per acre.
1	2	3	4	5	6	7	8	9	10	11	12	13
			lbs.	lbs.	Rs. a. p.			lbs.	lbs.	Rs. a. p.		
1	No irrigation ...	...	446	434	11 7 0	No irrigation ...	...	468	516	8 14 4	No irrigation ...	...
2	1st December 1910 ...	6,000	711	698	21 15 0	Do. ...	...	540	580	9 0 0	Do. ...	...
3	1st December 1910 ...	6,000	946	944	31 0 0	Do. ...	...	724	806	12 10 4	Do. ...	...
	1st January 1911 ...	4,000				1st January 1912 ...	4,000				1st January 1913 ...	4,000
4	1st December 1910 ...	6,000	1,028	1,120	35 4 8	No irrigation ...	...	780	1,060	12 12 0	No irrigation ...	...
	1st February 1911 ...	4,000				1st February 1912 ...	4,000				1st February 1913 ...	4,000
5	1st December 1910 ...	6,000	1,130	1,230	38 8 8	No irrigation ...	...	830	1,004	16 3 0	No irrigation ...	...
	1st January 1911 ...	4,000				1st January 1912 ...	4,000				1st January 1913 ...	4,000
	1st February 1911 ...	4,000				1st February 1912 ...	4,000				1st February 1913 ...	4,000
6	1st December 1910 ...	12,000	978	1,114	34 5 5	No irrigation ...	...	752	1,048	9 5 4	No irrigation ...	...
7	1st December 1910 ...	12,000	1,160	1,072	39 15 0	Do. ...	...	850	852	12 13 8	Do. ...	...
	1st January 1911 ...	4,000				1st January 1912 ...	4,000				1st January 1913 ...	4,000
8	1st December 1910 ...	12,000	1,019	946	33 11 0	No irrigation ...	...	780	842	12 12 0	No irrigation ...	...
	1st February 1911 ...	4,000				1st February 1912 ...	4,000				1st February 1913 ...	4,000
9	1st December 1910 ...	12,000	884	826	26 3 8	No irrigation ...	...	764	752	16 1 8	No irrigation ...	...
	1st January 1911 ...	4,000				1st January 1912 ...	4,000				1st January 1913 ...	4,000
	1st February 1911 ...	4,000				1st February 1912 ...	4,000				1st February 1913 ...	4,000
10	Irrigation when required.	...	664	616	19 4 4	No irrigation ...	...	576	504	8 15 0	No irrigation ...	...

for the irrigation of wheat grown continuously on black soil.
each plot—·25 acre.

1912-13.			Treatment 1913-14.							
Outturn per acre.		Profit per acre.	Date of irrigation.	Quantity of water in cubic feet per acre.	Outturn per acre.		Cost of cultivation per acre.	Value realized per acre.	Profit per acre.	Remarks on crops.
Grain.	Other.				Grain.	Other.				
14	15	16	17	18	19	20	21	22	23	24
lbs.	lbs.	Rs. a. p.			lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
631	626	19 0 1	No irrigation ..	...	422	446	10 4 4	23 9 8	13 5 4	Poorish. Bad damage by hares.
681	736	21 7 8	1st December 1913 ...	6,000	460	536	15 11 4	26 4 4	10 9 0	Bad damage by white ants.
708	786	19 12 1	1st December 1913 ...	6,000	640	752	19 11 4	36 9 8	16 14 4	Average plot.
			1st January 1914 ...	4,000						
1,018	1,138	32 14 10	1st December 1913 ...	6,000	674	646	18 2 0	37 1 0	18 15 0	Regular.
			1st February 1914 ...	4,000						
1,018	1,016	29 8 6	1st December 1913 ...	6,000	726	782	20 11 4	40 13 0	20 1 8	No damage.
			1st January 1914 ...	4,000						
			1st February 1914 ...	4,000						
856	1,004	29 8 10	1st December 1913 ...	12,000	612	760	21 4 8	35 7 0	14 2 4	Regular.
992	1,008	32 0 6	1st December 1913 ...	12,000	746	896	23 15 8	42 13 4	18 13 8	No damage.
			1st January 1914 ...	4,000						
870	904	25 14 9	No irrigation ...	...	602	526	12 10 4	32 9 8	19 15 4	December irrigation to Nos. 8 and 9 was not given owing to breakdown of oil engine.
			1st February 1914 ...	4,000						
850	870	22 6 4	No irrigation ...	...	564	592	16 5 8	31 9 0	15 3 4	
			1st January 1914 ..	4,000						
			1st February 1914 ..	4,000						
649	740	20 7 4	No irrigation ...	...	504	460	10 6 0	27 8 4	17 2 4	Damage by hares.

HAY MANURIAL EXPERIMENTS.

TO INVESTIGATE THE MANURIAL REQUIREMENTS OF HAY.

Area of each plot—·25 acre.

No. of plot.	Treatment.	Date of manuring.	Outturn per acre 1908-09.		Outturn per acre 1909-10.		Outturn per acre 1910-11.		Outturn per acre 1911-12.		Outturn per acre 1912-13.		Outturn per acre 1913-14.		Remarks
			Hay.	Other.	Hay.	Other.	Hay.	Other.	Hay.	Other.	Hay.	Other.	Hay.	Other.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
1	Unmanured ...	...	2,068	20	2,588	44	2,740	...	2,548	...	794	...	912	...	The crop this year was a light one among the pasture plots which are duplicate of the above. Nos. 10 and 11 have always looked better.
2	Superphosphate 250 lbs. ...	15th July 1909 ...	2,432	64	3,954	16	3,320	...	4,704	...	1,168	...	1,792	...	
3	Basic slag 187½ lbs. ...	Do. ...	2,236	100	3,956	48	2,792	...	3,020	...	824	...	1,268	...	
4	Superphosphate 166⅔ lbs. ...	Do. ...	2,220	80	4,220	68	3,372	...	3,740	...	1,156	...	2,148	...	
5	Superphosphate 166⅔ lbs. ... / Potassium sulphate 25 lbs. ...	Do. ...	2,316	48	4,824	60	3,328	...	4,140	...	1,250	...	2,192	...	
6	Ammonium sulphate 25 lbs. ...	Plots from Nos. 6 to 12 are manured every year.	2,784	48	4,880	4	3,232	...	2,144	...	1,258	...	2,108	...	
7	Sodium nitrate 33⅓ lbs. ...		2,436	20	4,504	24	3,000	...	3,760	...	1,182	...	1,544	...	
8	Superphosphate 41½ lbs. ...		2,448	48	4,696	52	2,856	...	3,888	...	1,066	...	1,752	...	
9	Superphosphate 41½ lbs. .. / Sulphate of potash 10 lbs. ...		2,160	52	4,888	60	2,908	...	4,700	...	1,012	...	1,672	..	
10	Superphosphate 41½ lbs. ... / Ammonium sulphate 25 lbs. ...		3,000	48	6,008	28	3,728	...	3,836	...	1,912	...	2,764	...	
11	Superphosphate 41½ lbs. ... / Ammonium sulphate 25 lbs. ... / Sulphate of potash 10 lbs. ...		2,652	72	5,820	24	3,984	...	4,816	...	1,536	...	2,380	...	
12	Farm yard manure ¾ ton ...		1,804	80	3,612	24	2,428	...	3,068	...	1,146	...	2,232	...	

III.—Varieties of Crops.

Kharif.

Cotton.—The season was unfavourable for the later varieties; and Rosea especially, which was sown in a poor field, gave only a single picking.

Variety.	Outturn per acre.	Ginning percentage.
	lbs.	Per cent.
Aligarh	331	40
Rosea	149	32·4
Saugor Jari, white flowered	461	34·4
Saugor Jari, yellow flowered	520	30·3
Malvensis	333	32·3
Chhappara	458	Not ginned.

The Saugor Jaris which ripen one month earlier than Rosea seem to be best suited to this Farm, and will now be given an extended trial.

Juar.—Saoner 1,031 lbs. per acre, Ramkel 413 lbs. per acre. The latter was sown on a poorer field.

Paddy.—Raskadam paddy 1,190 lbs. per acre. An early ripening variety of superior quality. The crop was sown broadcast and the field double cropped.

Groundnut.—The Big Japan variety gave 338 lbs. per acre. This is very poor outturn. This variety is not suited to the heavy soil of this Farm. The Small Japanese variety will be tried next year.

Soybeans.—Several varieties were obtained from the Principal, Agricultural College, Nagpur,—No. 9, No. 18, Mammoth, No. 4355, No. 4359 and Java Black. The first four are very early and make little growth. The last appears to be a fairly heavy yielder, and will be given a further trial next year.

Sugarcane.—Pounda from Jubbulpore was grown. The financial results have been as under:—

	Rs.	a.	p.
Canes sold retail	12	10	3
Gur manufactured and sold	24	3	3
3,500 canes planted at a minimum cost of Rs. 5 per hundred ...	175	0	0
Total ...	211	13	6

The cane was produced on ¼ acre, and the value worked out to over Rs. 800 per acre.

Chillies.—The early round and medium long chillies, selections made by the Economic Botanist, were grown. The long variety is much liked on account of its extreme pungency and good colour. The crop of the former was very poor, and the gross income from the combined crop was Rs. 35 per acre.

Tur.

Serial No.	Names.	Outturn per acre.	
1	2	3	
1	B-005	1,041 lbs.	
2	B-021	1,400 ,,	
3	Cawnpur *tur*	950 ,,	
4	Deshi red	128 ,,	Sown as mixed crop with til.
5	Motia	122 ,,	Sown as mixed crop with til.

Cawnpur *tur* has done better this year and is a month earlier than Nagpur *tur*. These varieties, with the exception of Motia, will be tried again next year.

Rabi Crops.

Gram.—Six varieties were tried—

Kabuli gram	...	328 lbs. outturn per acre.
Local ,,	...	516 ,, ,, ,,
Malida ,,	...	546 ,, ,, ,,
Nimar ,,	...	560 ,, ,, ,,
Pusa 5-a ,,	...	397 ,, ,, ,,
Pusa 5-b ,,	...	399 ,, ,, ,,

The two Pusa varieties are very late and do not compare favourably in yield with the other varieties and will be rejected. Malida gram has done very well. A sample was sent to Messrs. Ralli Bros., Bombay, for valuation. The following was received from the firm :—

> "The quality is exceptionally fine; as a matter of fact one of the finest qualities ever seen in Bombay. Its value is about Rs. 7-10-0 per cwt. as against—
>
> Rs. 5-5-0 Red Punjab gram,
>
> Rs. 5-8-0 Yellow Punjab gram,
>
> Rs. 6-2-0 Yellow Gujrat gram.
>
> At the price quoted it can be sold in Bombay in small quantities for confectionery."

Kabuli gram suffered from cloudy weather as many flowers dropped unfertilised. It is really a Soudan variety. Nimar gram has done best and will be given an extended trial. It possesses a peculiarly rough testa and is a very early ripening variety.

Peas.—Damoh peas 720 lbs. outturn per acre. Khaperkhera 250 lbs. outturn per acre.

The former is a superior type of field pea.

Oats.—Outturn 318 lbs. per acre. Were sown in low lying plots but suffered severely from the heat and drought in November and December.

Linseed.—Six varieties were received from the Principal, Agricultural College, Nagpur, and have yielded as below :—

Variety No. or name.	Outturn per acre.	Remarks.
1	2	3
	lbs.	
200,100, White	379	An even plot.
172,001 „	285	Fairly even.
5,800,120, Red	357	Even germination.
2,300,100 „	223	Patchy do.
274,001 „	325	Fairly even.
55,000 „	332	Very patchy.
Farm red linseed	374	Do.

The germination of linseed was irregular and the cloudy and hot weather after sowing caused some of the young plants to wither. The Farm linseed has again done well. The white linseed plot (No. 200,100) was very regular, but its yield is not really so good as some of the red types.

Purvi Maghai *Til.*—The average outturn was 203 lbs. per acre. In two fields it did well and the outturn there was 300 lbs. per acre. One big field suffered from high wind at the time of flowering and also from wilt, and the average of the whole Farm is therefore low.

Wheat.—The main varieties grown on the Farm were—

Bansi	...	584 lbs. outturn per acre.
Sukerhai Pissi	...	505 „ „ „
A-013	...	526 „ „ „
Jalaliya	...	558 „ „ „

The wheat crop was very forward this year and owing to the excessive heat in November did not tiller well.

The winter rains were very late, and many plants withered in October and November, large spaces along the boundaries of the fields growing no crops at all. The gross outturns are therefore, considering all these points, satisfactory.

A variety test for new varieties, mostly raised on this Farm, was as usual carried out on the *maryar* land.

Statement showing the yield of wheat varieties grown on the Powarkhera Farm in the year 1913-14.

No.	Name.	Area grown.	Actual yield.	Outturn per acre.
		Acres.	lbs. ozs.	lbs. ozs.
1	Pusa 4	1·20	564 0	470 0
2	Sukerhai Pissi	·46	367 0	797 13
3	A-013	·47	392 8	835 1
4	Malwa Pissi	·96	832 8	867 3
5	A-085	·96	750 4	781 12
6	A-049	·97	782 8	806 11
7	Bansi Nasik	·47	296 0	629 12
8	Hansi Pissi	2·3	1,556 8	676 12
9	A-093 wheat	·94	695 8	739 14
10	A-094	·43	314 0	730 4
11	A-095	·72	480 0	666 11
12	Dahutia	1·21	853 8	705 6
13	Bansi Farm	·99	666 0	672 12
14	A-096	·98	663 0	676 9
15	A-097	·46	308 0	669 9
16	A-098	1·00	672 0	672 0
17	A-099	·98	630 0	642 14
18	A-100	·96	698 0	727 1
19	A-007 Jalaliya*	·95	546 0*	574 12*

* Damaged by pig and smut.

Pusa 49 and Pusa 100 were also tried on a small scale and will be further tested next season.

IV.—Trials of Machines and Implements.

The Raja Harrow—Sold by Messrs. Volkart Bros., priced at Rs. 35-12-0. This implement is specially designed for breaking the crust of the soil during breaks in the rains or after the monsoon is over. It covers much more land than the Bakhar and is specially useful where a large area of land has to be harrowed in a short time.

Bon Accord Winnower has not proved altogether a success, as it does not separate wheat and gram properly—Its price, Rs. 190, is also high—Messrs. Sheodayal of Hoshangabad now supply a new sieve of perforated zinc sheeting specially designed to separate wheat and gram.

The Friend Mission Workshops at Rasulia are now turning out a satisfactory winnower made of teak wood, but the number they can supply is limited.

The Nerbudda Reaper.—(Agent, Messrs. Volkart Brothers, Bombay.) This machine has again proved most useful on this Farm as, in spite of the short crops in the district, the price of labour was higher than ever. Fifty acres were cut, averaging $5\frac{1}{2}$ acres per day, but a large area of wheat was so laid by the rain and hail storms that it could not be cut by machine.

The oil engine was used to work one gin and chaff cutter as well as the centrifugal pump. The big well is proving a valuable source of water, as it is impossible to exhaust it by the continuous working of the oil engine and pump.

A Poona furnace was erected and "gur" of excellent quality was manufactured by this process. As this system saves a great deal of fuel, it is proposed to demonstrate it in the Betul district next year.

The attached statement shows the number of machines and implements sold during the year from the Implement Depôt, and the demand for Monsoon ploughs is particularly worthy of note:—

Name of machine.	No. sold.
Messrs. Burn & Co.'s implements.	
Heavy Turn-wrest ploughs	8
Closed top pitcher spout pumps	1
Simplex Fodder Cutter	1
Hand Cultivator	1
Gardner's Oil Engine No. 4	1
Share of Turn-wrest plough	1
	13
Implements sold direct by firms.	
Monsoon ploughs	10
Nerbudda Reapers	2
Rasulia Iron Mote	1
Winnowers	56
	69
Implements from Implement Depôt.	
Monsoon ploughs	97
Spare points for Monsoon plough	176
Staple with plate for do.	1
Carried over	274

Name of machine.	No. sold.
Brought forward	274
Spare shares for Monsoon ploughs	2
Cross bar do.	1
Mould board do.	1
Spare bolts and nuts do.	12
Iron chains for Turn-wrest ploughs	3
Rasulia Iron Motes	7
Cawnpur Corn Shellers	4
Nerbudda Reapers	1
Scythe stones	7
Madras Mote	1
Akola Hoe	5
Sindh plough	1
Pieces of wire cloth for winnowers	8
Adjustable crank disc for winnowers	1
Spares for N. Reapers—	
Internal wheel	1
Seats	2
Road wheels	2
Cutting bar	1
Rachet	1
Spares for winnowers—	
Sets of wire cloth	2
Small pinion wheel	1
Adjustable crank disc	2
Bakher, *Daura*, *Dundia* } Made on the farm	1, 1, 1
	343
Grand Total	425

V.—Seed Depôt.

The demand for pure seed of selected varieties is greatly increasing and, although there are many seed farms in the Division which are supervised by the Department and which supply their surplus produce direct to cultivators, it is impossible to comply with all the demands from the produce of this Farm with its limited area.

Bansi and Sukerhai wheats, Sirkari (Purvi) *Til* and Rosea cotton are in chief demand. The selected line of Jalaliya, best known as Dahutia, has given excellent results, both as regards outturn and quality, and is in considerable demand in the area round the Farm.

The following statement shows the quantity of seed supplied from the Farm from 1st July 1913 to 30th June 1914:—

Name of seed.	Quantity sold.
1	2
Kharif.	lbs.
Hoshangabad *tur*	11
B-025 *tur*	55
Motia *tur*	8
B-021 *tur*	145
B-005 *tur*	117
Rosea cotton seed	10,576
Aligarh cotton seed	594
Raskadam paddy	403
Yellow *mung*	71
Saoner *juar*	44
Ramkel *juar*	70
Java Soybean	40
Big Japan Groundnut	20
Chillies	4
Rabi.	
White Sukerhai Pissi	33,150
Bansi Hoshangabad	17,929
Hansi Pissi	1,870
A-013 pissi	12,282
Sirdar X Zuff	54
Pusa-4 wheat	182
A-007 Jalaliya	1,761
Dahutia	45
A-050	182
A-049 wheat	182
A-093 „	40
A-094 „	40
A-095 „	40
Malida gram	2,203
Kabuli „	327
Nimar „	122
Local „	6,136
Oats	60
Nagpur white linseed No. 173000	172
Do. No. 181000	148
Damoh peas	425
Khaperkhera peas	81
Acclimatized peas	70
Purvi Maghai *til*	4,582

Statement showing the details of cropping during the year 1913-14.

Crop.	Area.	Crop.	Area.
1	2	3	4
Experimental *kharif*.		Non-experimental *kharif*.—(Concld.)	
Cotton	2·40	Cotton and *tur* varieties ...	1·46
Cotton and *tur*	·20	African *til* and Hoshangabad *tur* ...	·08
Juar	·60	Soybean varieties	·48
Juar and *Urid*	·20	Ramkel *juar* and yellow *mung* ...	3·00
Sann as fibre crop	·20	Saoner *juar*, green *urid* and yellow *mung* ...	2·55
Total ...	3·60	Cow peas (subordinate crop) ...	·09
Experimental *rabi*.		Total ...	19·82
Wheat	8·40	Non-experimental *rabi*.	
Gram	·40	Purvi Maghai *til* and Motia *tur* ...	12·87
Gram and wheat (*birra*) ...	·40	Purvi Maghai *til* and Hoshangabad *tur* ...	3·78
Linseed	·20	A-013 pissi	47·39
Wheat and linseed, mixed ...	·20	Sukerhai pissi	34·61
Masur	·20	Bansi wheat	18·19
Teora	·20	A-007 Jalaliya wheat	23·09
Rabi *til* and *tur*	·20	A-095 wheat	·64
Total ...	10·20	Wheat varieties	17·88
Total experimental area ...	13·80	Oats	·32
Double cropped area.		Kabuli gram	·75
Sugarcane after groundnut ...	·75	Nimari ,, ...	·75
Gram and *teora* after Raskadam paddy ...	·72	Malida ,, ...	16·67
Total ...	1·47	Local ,, ...	25·54
Garden Crops.		Pusa 5-a gram	·75
Chillies	·80	Pusa 5-b gram	·94
Khaperkhera peas	·12	*Teora*	·08
Damoh peas	·68	Linseed red	4·07
Sugarcane, last year's crop ...	·25	Linseed varieties	3·00
Sugarcane, planted this year ...	·71	Total ...	211·32
Total ...	2·56	Total non-experimental area including garden crops, &c.	235·17
Non-experimental *kharif*.		Margins and wells, &c.	1·77
Rosea cotton, B-005 *tur* and *ambari* ...	5·61	Total area of fields ...	250·74
Aligarh cotton, B-021 *tur* and *ambari* ...	6·55		

VI.—Expenditure and Receipts.

The receipts from this farm are higher than last year by nearly Rs. 2,000, a satisfactory state of affairs, which is mainly accounted for by the good crops of last year, but is also partly due to the increased demand for selected seed at enhanced rates.

The contingent expenditure shows a decrease of Rs. 1,500 over last year. The only item which shows a slight increase is "Servants paid from Contingencies." This increase is due to the further rise in the price of labour and the increased promotion to some of the permanent farm ploughmen.

Statement showing the receipts and expenditure of Powarkhera Experimental Farm for the financial year 1913-14.

Heads.	Amount.	Remarks.
	Rs. a. p.	
Receipts.		
Commercial sale of produce	2,856 14 7	
Distribution of seed	3,551 9 1	
Plant and implements	410 1 3	
Miscellaneous	200 9 3	
Total ...	7,019 2 2	
Expenditure.		
Contingencies	...	...
Charges for seed grain	109 7 1	
Farm buildings	198 5 5	The cost of dismantling manure pits.
Construction and repairs of roads and irrigation	147 14 0	
Purchase of cattle and implements	1,230 9 4	Purchasing of cotton gin shafting.
Feed and care of cattle	858 0 6	
Servants paid from contingencies	2,833 5 0	
Manure	108 10 0	
Wire fencing	0 8 0	
Service postage and telegram charges	100 3 0	
Stationery purchased locally	0 9 0	
Miscellaneous	317 13 6	
Total ...	5,905 4 10	
Establishment.		
Pay of Agricultural Assistants and Clerk	3,076 12 1	Excludes pay of Agriculture Assistant, Khandwa, and Demonstration Jamadars, Kamdars and Engineman, but the other Agricultural Assistants who have all their head-quarters on the farm and whose pay has been paid from the farm did much demonstration work.
Pay of servants	142 6 4	
Travelling allowance	47 13 0	
Total ...	3,266 15 5	

APPENDIX I.

Report on the short courses of instruction in practical Agriculture on the Powarkhera Farm, 1913-14.

The courses of instruction remained open on the farm during the year, and the total number of persons attending was 29.

The following list shows the number of students who attended the courses :—

Places from which the students came.	Students trained for the whole year.	*Kharif* sowing course.	*Rabi* sowing course.	*Rabi* harvest course.	Training in special subjects.	Total.
1	2	3	4	5	6	7
Government *kamdars* ...	...	2	...	...	...	2
Private bodies or Unions ...	2	...	...	...	...	2
Bhopal State ...	...	14	7	1	1	23*
Indore State ...	...	...	...	...	1	1
Betul District ...	...	...	...	...	1	1
Chhindwara District ...	...	...	...	...	1	1
Total ...	2	16	7	1	4	30

* One man from Bhopal State attended both the *kharif* and *rabi* sowing courses.

The following were the successful candidates completing the course :—

Places from which the students came.	Students trained for the whole year.	*Kharif* sowing course.	*Rabi* sowing course.	*Rabi* harvest course.	Training in special subjects.	Total.
1	2	3	4	5	6	7
Government *kamdars* ...	...	2	...	...	...	2
Private bodies or Unions ...	2	...	...	...	...	2
Bhopal State ...	...	3	1	1	1	6
Indore State ...	...	...	...	...	1	1
Chhindwara District ...	...	...	...	...	1	1
Total ...	2	5	1	1	3	12

The general tendency of the Bhopal men was to shirk the practical work, and only 6 out of 22 proved successful. Some left the Farm after a short stay of a few days.

Kharif Course.—This dealt fully with the sowing of the different crops in lines and intercultivation with bullock hoe.

The cultivation of groundnuts, sugarcane, etc., was also taught. Besides this the adjustment and the work of the Turn-wrest plough, Monsoon plough, Cultivator, Fodder Cutter, and Maize Shellers, etc., were also demonstrated and lectures were given on manures, cattle breeding, seed selection, rotation, etc. Ashraf Ali, a candidate from Bhopal State, purchased one Monsoon plough for his own farm.

In the *rabi* sowing course the candidates, besides the usual field work of sowing the seed with *nari* and *tifan* and with proper seed rates, also acquainted themselves with the work of mower and rake. Only one man attended the *rabi* harvest course. Regarding training in special subjects, the Chhindwara Court of Wards sent in a man to be trained in cattle breeding and management of stock. He was fully trained in every branch of the cattle breeding farm work. The Bhopal State sent a man to be trained in the work of the reaper. He has learnt the work fully and has been able to set up and work the reaper recently purchased by the State through this Farm.

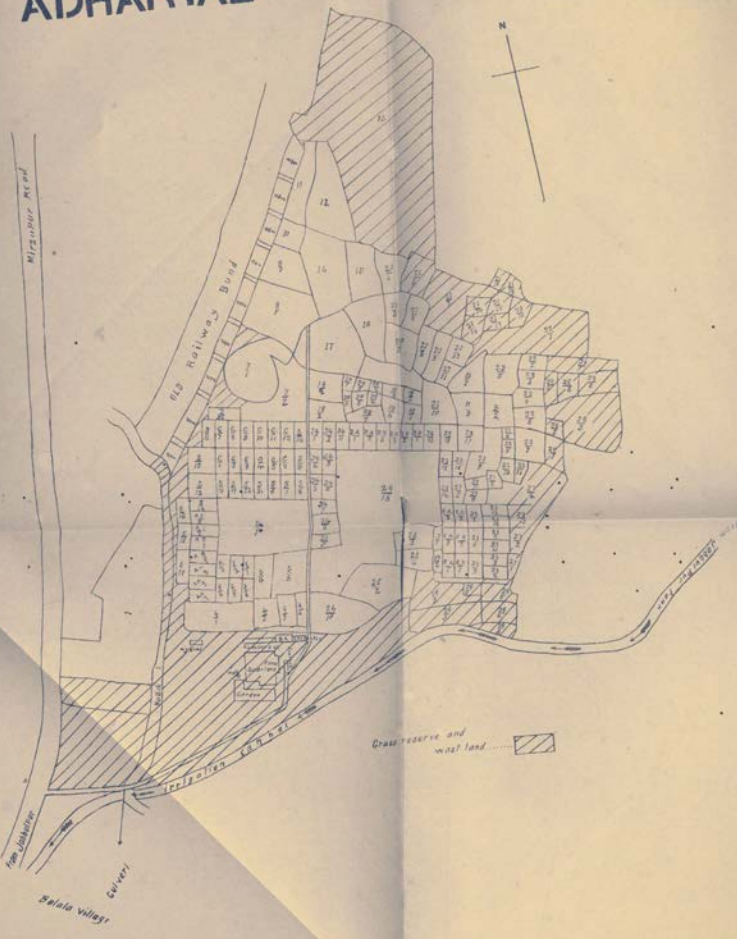
The Indore State also sent a man to learn the work of the reaper.

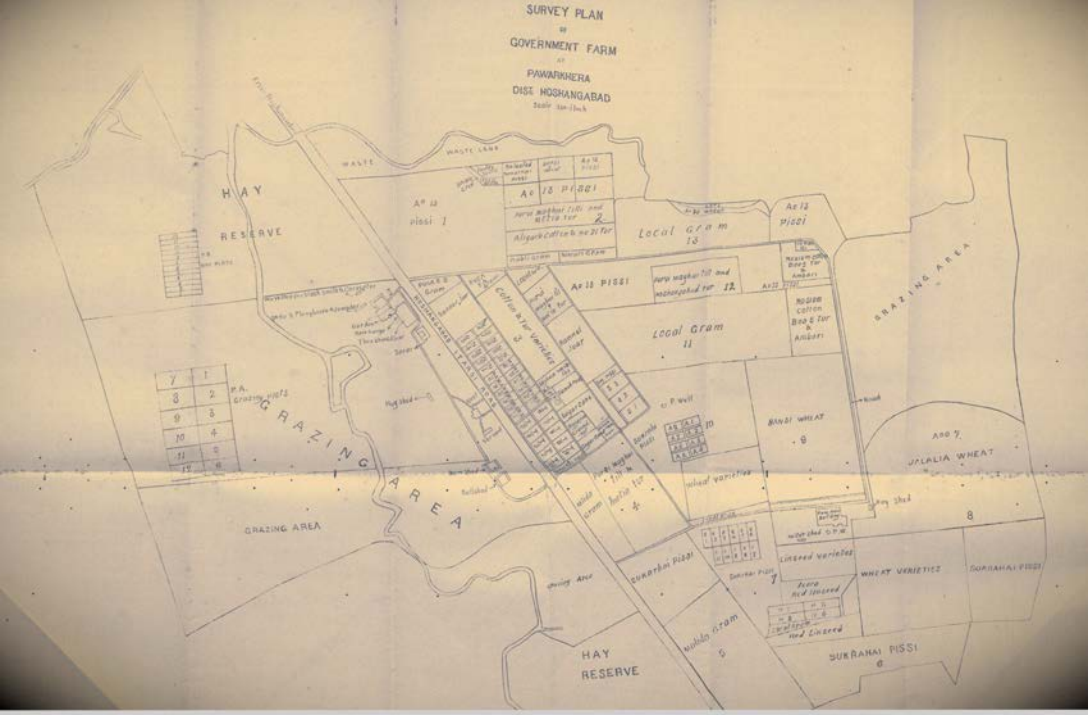
Mannulal, *kamdar* of the Betul Union Farm, stayed for over 10 months, and was trained in every branch of the Farm work generally. He left on the 9th March 1914 to work the reaper on the Betul Farm.

Tulsi Ram, Kamdar of Seoni-Malwa Agricultural Sub-Association, joined the Farm on the 1st June 1913, and will shortly complete his term of one year. He has received general training in all the farm work. Both of these *kamdars* have done well.

COVERNMENT FARM

ADHARTAL




SURVEY PLAN
OF
GOVERNMENT FARM
AT
PAWARKHERA
DIST HOSHANGABAD
HAY
RESERVE
WASTE
WASTE LAND
GRAZING AREA
Local Gram
18
Local Gram
11
Local Gram
12
Cotton Arboreum Varieties
Cotton Herbaceum Varieties
Cotton Hirsutum Varieties
Cotton Barbadense Varieties
Bajra
Bajra Fodder
Maize
Maize Fodder
Jowar
Jowar Fodder
Kharif Fodder
Rabi Fodder
Sugarcane
Sugarcane Fodder
Vegetables
Fruits
Fruit Trees
Forest Trees
Fencing
Hedges
Hedges Trees
Boundary Trees
Road
Cart Track
Foot Path
Nullah
Nullah Bank
Tube Well
Pump House
Engine House
Cattle Shed
Hay Shed
Store
Office
Residence
Servants Quarters
Labourers Quarters
Cattle Pound
Manure Pit
Compost Pit
Threshing Floor
Well
Kutcha Well
Pucca Well
Boring
Water Course
Irrigation Channel
Drainage
Contour
Boundary
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Scale
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Enlargement
Reduction
Copy
Original
Tracing
Blueprint
Photograph
Negative
Positive
Film
Paper
Cloth
Linen
Canvas
Ink
Pencil
Colour
Red
Blue
Green
Yellow
Black
White
Brown
Grey
Orange
Purple
Pink
Gold
Silver
Bronze
Copper
Iron
Steel
Wood
Stone
Brick
Concrete
Glass
Plastic
Rubber
Leather
Fabric
Thread
Needle
Scissors
Knife
Hammer
Nail
Screw
Bolt
Nut
Washer
Spring
Wire
Cable
Rope
Chain
Hook
Eye
Ring
Pin
Clip
Tape
Glue
Paint
Varnish
Oil
Grease
Water
Air
Gas
Steam
Heat
Cold
Light
Dark
Shadow
Reflection
Refraction
Diffraction
Interference
Polarization
Magnetism
Electricity
Gravity
Motion
Force
Energy
Power
Work
Time
Space
Matter
Mass
Weight
Volume
Density
Pressure
Temperature
Humidity
Wind
Rain
Snow
Ice
Fog
Cloud
Storm
Thunder
Lightning
Earthquake
Volcano
Mountain
Valley
River
Lake
Ocean
Island
Continent
Country
State
District
Taluka
Village
Town
City
Address
Name
Date
Signature
Witness
Seal
Stamp
Certificate
Deed
Agreement
Contract
Lease
Mortgage
Loan
Interest
Principal
Tax
Revenue
Expenditure
Profit
Loss
Balance
Account
Bank
Cash
Cheque
Draft
Note
Coin
Currency
Exchange
Rate
Price
Cost
Value
Quantity
Unit
Measure
Weight
Length
Area
Volume
Time
Speed
Distance
Direction
North
South
East
West
Up
Down
Left
Right
Forward
Backward
Inside
Outside
Above
Below
Between
Among
Near
Far
Here
There
Where
When
How
Why
What
Who
Which
Whose
Whom
Yes
No
Maybe
Always
Never
Sometimes
Often
Rarely
Usually
Occasionally
Frequently
Infrequently
Regularly
Irregularly
Periodically
Continuously
Intermittently
Suddenly
Gradually
Slowly
Quickly
Fast
Slow
Early
Late
On Time
Delayed
Postponed
Cancelled
Completed
Started
Finished
Ongoing
Pending
Approved
Rejected
Accepted
Declined
Agreed
Disagreed
Signed
Unsigned
Dated
Undated
Numbered
Unnumbered
Lettered
Unlettered
Titled
Untitled
Captioned
Uncaptioned
Labelled
Unlabelled
Marked
Unmarked
Coloured
Uncoloured
Shaded
Unshaded
Hatched
Unhatched
Crosshatched
Stippled
Dotted
Dashed
Solid
Broken
Continuous
Discontinuous
Straight
Curved
Angled
Circular
Rectangular
Square
Triangular
Polygonal
Irregular
Regular
Symmetrical
Asymmetrical
Balanced
Unbalanced
Proportional
Disproportional
Scaled
Unscaled
Measured
Unmeasured
Calculated
Uncalculated
Estimated
Unestimated
Approximated
Unapproximated
Exact
Inexact
Precise
Imprecise
Accurate
Inaccurate
Correct
Incorrect
True
False
Valid
Invalid
Legal
Illegal
Lawful
Unlawful
Permitted
Prohibited
Allowed
Disallowed
Authorized
Unauthorized
Official
Unofficial
Public
Private
Open
Closed
Free
Paid
Cheap
Expensive
Rich
Poor
Wealthy
Poverty
Success
Failure
Win
Lose
Draw
Tie
Game
Play
Work
Rest
Sleep
Wake
Eat
Drink
Breathe
Live
Die
Birth
Death
Life
Health
Sickness
Disease
Cure
Medicine
Doctor
Nurse
Hospital
Clinic
Pharmacy
Drug
Vaccine
Virus
Bacteria
Germ
Infection
Immunity
Allergy
Pain
Relief
Comfort
Discomfort
Happiness
Sadness
Anger
Fear
Love
Hate
Joy
Grief
Surprise
Disgust
Trust
Distrust
Hope
Despair
Faith
Doubt
Belief
Disbelief
Knowledge
Ignorance
Wisdom
Foolishness
Intelligence
Stupidity
Memory
Forgetfulness
Learning
Teaching
Education
School
College
University
Student
Teacher
Professor
Book
Library
Study
Research
Science
Art
Music
Dance
Theatre
Cinema
Film
Photography
Painting
Sculpture
Literature
Poetry
Prose
Novel
Story
Drama
Comedy
Tragedy
Romance
Mystery
Horror
Fantasy
Science Fiction
Biography
Autobiography
History
Geography
Mathematics
Physics
Chemistry
Biology
Astronomy
Geology
Meteorology
Ecology
Environment
Pollution
Conservation
Recycling
Waste
Garbage
Sewage
Water Supply
Electricity Supply
Gas Supply
Telephone
Internet
Computer
Software
Hardware
Program
Data
Information
Communication
Transportation
Road
Railway
Airport
Seaport
Bridge
Tunnel
Vehicle
Car
Bus
Truck
Train
Aeroplane
Ship
Boat
Bicycle
Motorcycle
Scooter
Auto Rickshaw
Taxi
Ambulance
Fire Engine
Police
Army
Navy
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War
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Treaty
Alliance
Enemy
Friend
Neighbour
Family
Father
Mother
Son
Daughter
Brother
Sister
Husband
Wife
Child
Parent
Grandparent
Grandchild
Uncle
Aunt
Nephew
Niece
Cousin
Marriage
Divorce
Adoption
Inheritance
Will
Property
Land
House
Building
Room
Kitchen
Bathroom
Bedroom
Living Room
Dining Room
Garden
Yard
Gate
Door
Window
Wall
Floor
Ceiling
Roof
Stairs
Lift
Furniture
Table
Chair
Bed
Sofa
Cupboard
Shelf
Mirror
Lamp
Clock
Television
Radio
Refrigerator
Washing Machine
Air Conditioner
Fan
Heater
Stove
Oven
Microwave
Toaster
Kettle
Utensil
Cutlery
Plate
Cup
Glass
Bowl
Spoon
Fork
Knife
Food
Vegetable
Fruit
Meat
Fish
Egg
Milk
Cheese
Butter
Bread
Rice
Wheat
Flour
Sugar
Salt
Spice
Oil
Vinegar
Sauce
Soup
Salad
Dessert
Cake
Biscuit
Chocolate
Ice Cream
Tea
Coffee
Juice
Soft Drink
Alcohol
Beer
Wine
Whisky
Cigarette
Tobacco
Clothing
Shirt
Trousers
Skirt
Dress
Suit
Jacket
Coat
Hat
Shoe
Sock
Glove
Scarf
Tie
Belt
Bag
Purse
Wallet
Jewellery
Ring
Necklace
Bracelet
Earring
Watch
Spectacles
Sunglasses
Umbrella
Raincoat
Boot
Sandal
Slipper
Uniform
Costume
Fashion
Style
Colour
Pattern
Texture
Material
Cotton
Wool
Silk
Linen
Nylon
Polyester
Leather
Fur
Feather
Paper
Pen
Pencil
Eraser
Ruler
Compass
Protractor
Calculator
Notebook
Diary
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Globe
Atlas
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Encyclopedia
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Thesis
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Stamp
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Fax
Email
Website
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Social Media
Facebook
Twitter
Instagram
YouTube
WhatsApp
Google
Search
Browser
Download
Upload
Share
Like
Comment
Follow
Subscribe
Unsubscribe
Block
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Spam
Virus
Hacker
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Agenda
Minutes
Action
Decision
Vote
Election
Candidate
Party
Government
Minister
President
Prime Minister
Governor
Chief Minister
Mayor
Councillor
Member
Leader
Opposition
Parliament
Assembly
Council
Committee
Commission
Court
Judge
Lawyer
Advocate
Barrister
Solicitor
Notary
Witness
Oath
Affidavit
Petition
Appeal
Verdict
Sentence
Fine
Imprisonment
Bail
Parole
Probation
Crime
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Life Imprisonment
Rehabilitation
Reform
Prison
Jail
Cell
Warden
Guard
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Prisoner
Escape
Riot
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Demonstration
March
Rally
Slogan
Flag
Banner
Poster
Leaflet
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Birthday
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Party
Dance
Music
Song
Singer
Musician
Instrument
Piano
Guitar
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Lion
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Cow
Buffalo
Goat
Sheep
Dog
Cat
Rabbit
Bird
Snake
Fish
Insect
Butterfly
Bee
Ant
Spider
Mosquito
Fly
Cockroach
Termite
Worm
Snail
Frog
Crocodile
Turtle
Monkey
Bear
Deer
Fox
Wolf
Jackal
Hyena
Camel
Donkey
Mule
Pig
Rat
Mouse
Squirrel
Hedgehog
Bat
Owl
Eagle
Hawk
Crow
Sparrow
Pigeon
Parrot
Peacock
Duck
Goose
Chicken
Hen
Rooster
Egg
Nest
Feather
Beak
Claw
Wing
Tail
Leg
Foot
Head
Eye
Ear
Nose
Mouth
Tooth
Tongue
Hair
Skin
Bone
Muscle
Blood
Heart
Lung
Liver
Kidney
Stomach
Intestine
Brain
Nerve
Spine
Skeleton
Joint
Finger
Thumb
Toe
Nail
Navel
Breast
Arm
Leg
Hand
Foot
Face
Neck
Shoulder
Back
Chest
Waist
Hip
Thigh
Knee
Ankle
Elbow
Wrist
Palm
Sole
Heel
Ankle
Calf
Shin
Knee
Thigh
Hip
Waist
Abdomen
Chest
Back
Shoulder
Neck
Head
Face
Eye
Ear
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Lip
Tooth
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Chin
Cheek
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Eyebrow
Eyelash
Eyelid
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Large Intestine
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Spleen
Kidney
Ureter
Bladder
Urethra
Penis
Testis
Scrotum
Vagina
Uterus
Ovary
Fallopian Tube
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Wrong
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Income Tax
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Service Tax
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Excise Duty
Property Tax
Professional Tax
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Gain
Investment
Share
Stock
Bond
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Insurance
Premium
Policy
Claim
Settlement
Nominee
Beneficiary
Trust
Trustee
Will
Testament
Executor
Probate
Succession
Inheritance
Property
Land
House
Building
Flat
Apartment
Plot
Survey
Boundary
Measurement
Area
Square Feet
Square Metre
Acre
Hectare
Bigha
Guntha
Gaj
Yard
Foot
Inch
Metre
Centimetre
Millimetre
Kilometre
Mile
Litre
Gallon
Kilogram
Gram
Quintal
Tonne
Pound
Ounce
Dozen
Hundred
Thousand
Million
Billion
Trillion
Zero
One
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Thousand
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Billion
Trillion
First
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Fifth
Sixth
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Eighth
Ninth
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Last
Next
Previous
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Present
Past
Future
Today
Yesterday
Tomorrow
Week
Month
Year
Decade
Century
Millennium
Morning
Afternoon
Evening
Night
Midnight
Noon
Hour
Minute
Second
Clock
Watch
Calendar
Date
Day
Month
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Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
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January
February
March
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July
August
September
October
November
December
Spring
Summer
Autumn
Winter
Season
Weather
Climate
Temperature
Rainfall
Humidity
Wind
Storm
Cyclone
Flood
Drought
Earthquake
Volcano
Tsunami
Landslide
Avalanche
Mountain
Hill
Valley
River
Stream
Lake
Pond
Ocean
Sea
Island
Peninsula
Continent
Country
State
District
Taluka
Village
Town
City
Address
Pincode
Postal
Telegraph
Telephone
Mobile
Fax
Email
Website
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Software
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Parent
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Grandchild
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Nephew
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Inheritance
Will
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Fish
Egg
Milk
Cheese
Butter
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Wheat
Flour
Sugar
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Dress
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Hat
Shoe
Sock
Glove
Scarf
Tie
Belt
Bag
Purse
Wallet
Jewellery
Ring
Necklace
Bracelet
Earring
Watch
Spectacles
Sunglasses
Umbrella
Raincoat
Boot
Sandal
Slipper
Uniform
Costume
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Texture
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Cotton
Wool
Silk
Linen
Nylon
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Upload
Share
Like
Comment
Follow
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Government
Minister
President
Prime Minister
Governor
Chief Minister
Mayor
Councillor
Member
Leader
Opposition
Parliament
Assembly
Council
Committee
Commission
Court
Judge
Lawyer
Advocate
Barrister
Solicitor
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Imprisonment
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Dance
Music
Song
Singer
Musician
Instrument
Piano
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Drum
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Microphone
Speaker
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Role
Character
Script
Rehearsal
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Cat
Rabbit
Bird
Snake
Fish
Insect
Butterfly
Bee
Ant
Spider
Mosquito
Fly
Cockroach
Termite
Worm
Snail
Frog
Crocodile
Turtle
Monkey
Bear
Deer
Fox
Wolf
Jackal
Hyena
Camel
Donkey
Mule
Pig
Rat
Mouse
Squirrel
Hedgehog
Bat
Owl
Eagle
Hawk
Crow
Sparrow
Pigeon
Parrot
Peacock
Duck
Goose
Chicken
Hen
Rooster
Egg
Nest
Feather
Beak
Claw
Wing
Tail
Leg
Foot
Head
Eye
Ear
Nose
Mouth
Tooth
Tongue
Hair
Skin
Bone
Muscle
Blood
Heart
Lung
Liver
Kidney
Stomach
Intestine
Brain
Nerve
Spine
Skeleton
Joint
Finger
Thumb
Toe
Nail
Navel
Breast
Arm
Leg
Hand
Foot
Face
Neck
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Back
Chest
Waist
Hip
Thigh
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Ankle
Elbow
Wrist
Palm
Sole
Heel
Ankle
Calf
Shin
Knee
Thigh
Hip
Waist
Abdomen
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Back
Shoulder
Neck
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Testis
Scrotum
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Ovary
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Placenta
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Circular
Order
Instruction
Guideline
Manual
Handbook
Code
Standard
Specification
Tender
Quotation
Invoice
Receipt
Voucher
Bill
Payment
Cash
Cheque
Draft
Bank
Account
Savings
Current
Fixed Deposit
Recurring Deposit
Loan
Interest
Principal
Tax
Income Tax
Sales Tax
Value Added Tax
Service Tax
Customs Duty
Excise Duty
Property Tax
Professional Tax
Revenue
Expenditure
Budget
Surplus
Deficit
Balance
Profit
Loss
Gain
Investment
Share
Stock
Bond
Mutual Fund
Insurance
Premium
Policy
Claim
Settlement
Nominee
Beneficiary
Trust
Trustee
Will
Testament
Executor
Probate
Succession
Inheritance
Property
Land
House
Building
Flat
Apartment
Plot
Survey
Boundary
Measurement
Area
Square Feet
Square Metre
Acre
Hectare
Bigha
Guntha
Gaj
Yard
Foot
Inch
Metre
Centimetre
Millimetre
Kilometre
Mile
Litre
Gallon
Kilogram
Gram
Quintal
Tonne
Pound
Ounce
Dozen
Hundred
Thousand
Million
Billion
Trillion
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Tomorrow
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Decade
Century
Millennium
Morning
Afternoon
Evening
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Midnight
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Second
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November
December
Spring
Summer
Autumn
Winter
Season
Weather
Climate
Temperature
Rainfall
Humidity
Wind
Storm
Cyclone
Flood
Drought
Earthquake
Volcano
Tsunami
Landslide
Avalanche
Mountain
Hill
Valley
River
Stream
Lake
Pond
Ocean
Sea
Island
Peninsula
Continent
Country
State
District
Taluka
Village
Town
City
Address
Pincode
Postal
Telegraph
Telephone
Mobile
Fax
Email
Website
Internet
Computer
Software
Hardware
Program
Data
Information
Communication
Transportation
Road
Railway
Airport
Seaport
Bridge
Tunnel
Vehicle
Car
Bus
Truck
Train
Aeroplane
Ship
Boat
Bicycle
Motorcycle
Scooter
Auto Rickshaw
Taxi
Ambulance
Fire Engine
Police
Army
Navy
Air Force
War
Peace
Treaty
Alliance
Enemy
Friend
Neighbour
Family
Father
Mother
Son
Daughter
Brother
Sister
Husband
Wife
Child
Parent
Grandparent
Grandchild
Uncle
Aunt
Nephew
Niece
Cousin
Marriage
Divorce
Adoption
Inheritance
Will
Property
Land
House
Building
Room
Kitchen
Bathroom
Bedroom
Living Room
Dining Room
Garden
Yard
Gate
Door
Window
Wall
Floor
Ceiling
Roof
Stairs
Lift
Furniture
Table
Chair
Bed
Sofa
Cupboard
Shelf
Mirror
Lamp
Clock
Television
Radio
Refrigerator
Washing Machine
Air Conditioner
Fan
Heater
Stove
Oven
Microwave
Toaster
Kettle
Utensil
Cutlery
Plate
Cup
Glass
Bowl
Spoon
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Knife
Food
Vegetable
Fruit
Meat
Fish
Egg
Milk
Cheese
Butter
Bread
Rice
Wheat
Flour
Sugar
Salt
Spice
Oil
Vinegar
Sauce
Soup
Salad
Dessert
Cake
Biscuit
Chocolate
Ice Cream
Tea
Coffee
Juice
Soft Drink
Alcohol
Beer
Wine
Whisky
Cigarette
Tobacco
Clothing
Shirt
Trousers
Skirt
Dress
Suit
Jacket
Coat
Hat
Shoe
Sock
Glove
Scarf
Tie
Belt
Bag
Purse
Wallet
Jewellery
Ring
Necklace
Bracelet
Earring
Watch
Spectacles
Sunglasses
Umbrella
Raincoat
Boot
Sandal
Slipper
Uniform
Costume
Fashion
Style
Colour
Pattern
Texture
Material
Cotton
Wool
Silk
Linen
Nylon
Polyester
Leather
Fur
Feather
Paper
Pen
Pencil
Eraser
Ruler
Compass
Protractor
Calculator
Notebook
Diary
Calendar
Map
Globe
Atlas
Dictionary
Encyclopedia
Newspaper
Magazine
Journal
Report
Thesis
Dissertation
Essay
Letter
Envelope
Stamp
Postcard
Telegram
Fax
Email
Website
Blog
Social Media
Facebook
Twitter
Instagram
YouTube
WhatsApp
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Spam
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Register
Profile
Avatar
Status
Message
Chat
Call
Video Call
Conference
Meeting
Agenda
Minutes
Action
Decision
Vote
Election
Candidate
Party
Government
Minister
President
Prime Minister
Governor
Chief Minister
Mayor
Councillor
Member
Leader
Opposition
Parliament
Assembly
Council
Committee
Commission
Court
Judge
Lawyer
Advocate
Barrister
Solicitor
Notary
Witness
Oath
Affidavit
Petition
Appeal
Verdict
Sentence
Fine
Imprisonment
Bail
Parole
Probation
Crime
Criminal
Victim
Police
Detective
Investigation
Evidence
Arrest
Warrant
Search
Seizure
Confession
Trial
Hearing
Testimony
Cross-examination
Defence
Prosecution
Jury
Verdict
Guilty
Innocent
Acquittal
Conviction
Punishment
Death Penalty
Life Imprisonment
Rehabilitation
Reform
Prison
Jail
Cell
Warden
Guard
Inmate
Prisoner
Escape
Riot
Strike
Protest
Demonstration
March
Rally
Slogan
Flag
Banner
Poster
Leaflet
Pamphlet
Brochure
Advertisement
Boycott
Picketing
Lockout
Union
Labour
Employer
Employee
Wage
Salary
Bonus
Allowance
Deduction
Provident Fund
Gratuity
Pension
Retirement
Resignation
Termination
Dismissal
Promotion
Demotion
Transfer
Posting
Leave
Holiday
Festival
Celebration
Ceremony
Wedding
Funeral
Birthday
Anniversary
Party
Dance
Music
Song
Singer
Musician
Instrument
Piano
Guitar
Violin
Drum
Flute
Harmonium
Tabla
Sitar
Orchestra
Band
Concert
Recital
Performance
Audience
Applause
Encore
Ticket
Admission
Entry
Exit
Queue
Waiting
Seat
Stage
Curtain
Lighting
Sound
Microphone
Speaker
Amplifier
Recording
Studio
Producer
Director
Actor
Actress
Role
Character
Script
Rehearsal
Costume
Makeup
Wig
Mask
Puppet
Magic
Trick
Illusion
Circus
Clown
Acrobat
Juggler
Animal
Lion
Tiger
Elephant
Horse
Cow
Buffalo
Goat
Sheep
Dog
Cat
Rabbit
Bird
Snake
Fish
Insect
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Bee
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Spider
Mosquito
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Cockroach
Termite
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Turtle
Monkey
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Deer
Fox
Wolf
Jackal
Hyena
Camel
Donkey
Mule
Pig
Rat
Mouse
Squirrel
Hedgehog
Bat
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Eagle
Hawk
Crow
Sparrow
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Brain
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Spine
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Ear
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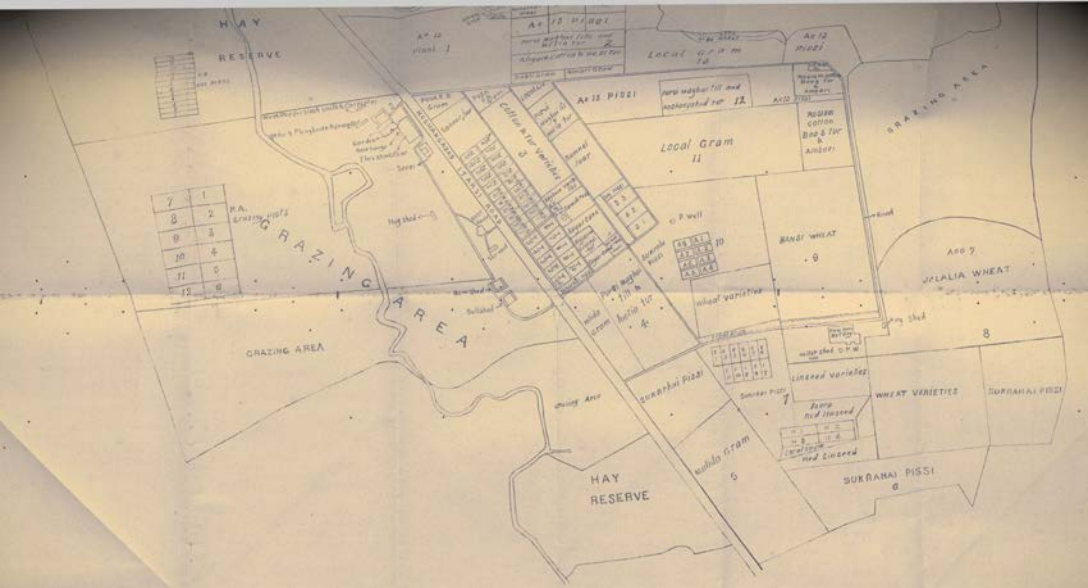
Tooth
Tongue
Chin
Cheek
Forehead
Eyebrow
Eyelash
Eyelid
Pupil
Iris
Retina
Optic Nerve
Ear Drum
Nostril
Septum
Gum
Palate
Throat
Larynx
Vocal Cords
Windpipe
Oesophagus
Stomach
Small Intestine
Large Intestine
Rectum
Anus
Liver
Gall Bladder
Pancreas
Spleen
Kidney
Ureter
Bladder
Urethra
Penis
Testis
Scrotum
Vagina
Uterus
Ovary
Fallopian Tube
Placenta
Umbilical Cord
Foetus
Baby
Infant
Toddler
Child
Adolescent
Youth
Adult
Middle Age
Old Age
Elderly
Senior Citizen
Retirement
Pension
Death
Funeral
Cremation
Burial
Grave
Tombstone
Epitaph
Obituary
Condolence
Mourning
Widow
Widower
Orphan
Adoption
Foster Care
Guardian
Ward
Minor
Major
Age
Birthday
Anniversary
Celebration
Party
Gift
Present
Card
Greeting
Wish
Blessing
Prayer
Temple
Church
Mosque
Gurudwara
Synagogue
Priest
Pastor
Imam
Rabbi
Monk
Nun
Religion
Hinduism
Christianity
Islam
Sikhism
Buddhism
Jainism
Judaism
Zoroastrianism
Atheism
Agnosticism
Faith
Belief
Worship
God
Goddess
Deity
Idol
Image
Statue
Temple
Church
Mosque
Gurudwara
Synagogue
Pilgrimage
Festival
Holy
Sacred
Profane
Secular
Religious
Spiritual
Soul
Heaven
Hell
Purgatory
Reincarnation
Karma
Dharma
Moksha
Nirvana
Salvation
Sin
Virtue
Vice
Good
Evil
Right
Wrong
Truth
Lie
Honesty
Dishonesty
Integrity
Corruption
Bribery
Fraud
Theft
Robbery
Burglary
Murder
Assault
Violence
Peace
Non-violence
Ahimsa
Satyagraha
Civil Disobedience
Freedom
Independence
Democracy
Republic
Monarchy
Dictatorship
Communism
Socialism
Capitalism
Liberalism
Conservatism
Nationalism
Patriotism
Citizenship
Rights
Duties
Constitution
Law
Order
Justice
Equality
Liberty
Fraternity
Secularism
Federalism
Unitary
Parliamentary
Presidential
Executive
Legisl


HAY RESERVE
GRAZING AREA
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Annual report on the Government Experimental Farm, Adhartal, near Jubbulpore, for the year 1913-14.

By

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General.

1. This Farm was opened in the year 1912 when 115·00 acres of land were selected and acquired. During the current year, however, further additions have been made for the purpose of affording a grazing area for the Farm cattle, and also for constructing an approach road from the Mirzapur Road to the Farm. The total area acquired amounted to 31·03 acres.

A further area of 50·01 acres of black wheat land has been lately acquired in the village of Kheri, about 3 miles from the Adhartal Farm. Only a very small portion of the land on the Adhartal Farm is suitable for wheat cultivation and the demand for selected wheat varieties has been so keen during the last year that more land was essential for its production. Consequently this area was selected and has been acquired, but no cultivation has as yet been done on it.

The area is commanded by the Jubbulpore Irrigation Tank as the original intention was to confine the work on the Farm very largely to matters concerning the economical use of water and the methods of cultivation best suited to areas commanded by the many small Irrigation schemes which have recently been opened in this Division.

It was soon evident, however, that the Farm would have far wider functions than this, and it is rapidly developing into the head-quarters of all improvements in Agriculture, both from the research and educational point of view, for the whole Division.

The land consists of *sihar* and *domatta* soils of inferior quality which is, however, typical of much of the land in the Division.

The area of the Farm was utilized as follows :—

Details of area.	Acreage.	Total.	Grand total.
Experimental	8·68	8·68	
Non-experimental *kharif*	31·823	...	
Non-experimental *rabi*	18·87	...	
Garden crops	2·33	53·023	
Roads and buildings	7·62	7·62	
Fallow area	30·55	30·55	
Grazing and grass reserve	41·84	41·84	141·71

BUILDINGS AND ROADS.

Further additions to the buildings have been made during the year under report and are as follows :—

(1) Carpenter and blacksmith's workshops and quarters.
(2) Six *jamadars'* quarters.
(3) Ten ploughmen's quarters.
(4) Two Probationers' quarters.

A large pandal for the Annual Divisional Agricultural Show is under construction. The money has been granted by the Local Board for this purpose.

The approach road to the Farm was completed after the rains, when it received metalling. Two new Farm roads have been constructed to allow easy access for carts in the rains. Bunding operations have been the main work of the hot weather. The fields were very irregular in shape and the bunds were low and useless. Rectangular fields have been made and the results should be more reliable in future. Levelling has also been done in many of the fields.

Visitors—The Farm was visited twice by the Hon'ble the Chief Commissioner (the Hon'ble Mr. H. A. Crump), the Commissioner, Jubbulpore Division, and also by the Deputy Commissioners, Jubbulpore, Mandla, Betul, Damoh and

Saugor, besides other officers. Fifteen hundred cultivators and malguzars visited the Farm during the year under report.

Climate.—Jubbulpore is situated at the head of the fertile Nerbudda valley and owing to the proximity of forest and its comparatively high situation (1,300 feet) it enjoys an equable climate. Frost occasionally occurs and the cold weather is more marked than in the rest of the Central Provinces, while the hot weather is rarely of long duration.

The following table represents the temperatures taken on the Adhartal Farm during the year under roport:—

Month.		Average maximum.	Average minimum.
June 1913	1st Half	93·86	79·60
	2nd „	92·28	69·88
July „	1st „	88·53	75·88
	2nd „	82·50	74·73
August „	1st „	82·08	72·10
	2nd „	85·22	73·41
September „	1st „	22·91	72·43
	2nd „	80·56	72·06
October „	1st „	92·16	68·93
	2nd „	95·87	62·62
November „	1st „	90·78	56·58
	2nd „	84·90	52·10
December „	1st „	85·50	48·60
	2nd „	16·65	46·00
January 1914	1st „	13·50	49·96
	2nd „	87·31	54·12
February „	1st „	88·33	56·76
	2nd „	86·00	57·31
March „	1st „	85·63	58·96
	2nd „	92·81	59·28
April „	1st „	95·76	68·46
	2nd „	103·60	75·91
May „	1st „	102·73	76·93
	2nd „		

Character of the season.—The rains set in early in June. The first shower was received on the 6th, and continued till the 14th, during which time 4·15″ were registered. Sowings started on the 11th. There were no long breaks and the germination of all the crops was satisfactory. During July and August the rainfall was well distributed, allowing weeding and intercultivation to be carried out. Tank water had to be frequently employed, however, to help in transplantation work. The rains ceased at the end of August, only 1·05″ being received in September and the crop of paddy was saved only by application of tank water. The preparation of the land for *rabi* crops was also hampered and rendered difficult on account of the poor falls towards the end of the rains. A proper tilth could not be produced and the large clods were difficult to disintegrate.

The rabi sowings were commenced in the first week of October. The germination was good, but the abnormal heat during the latter part of October, when 102° was recorded, killed off a large number of plants, especially on the higher levels. This was checked to some extent by giving timely waterings.

Towards the end of the *rabi* season storms of hail and rain did some slight damage, although the loss on the Farm was nothing compared to the loss in other parts of the Jubbulpore district, especially in Sihora.

Rainfall.—The rainfall for the year was 38·60" being much below that of the previous year.

Statement of rainfall.

Months.			Amount of rainfall.	Total.
June	1913	1st Half	4·15	
		2nd „	5·47	
July	„	1st „	4·73	
		2nd „	6·20	
August	„	1st „	7·26	
		2nd „	3·87	
September	„	1st „	1·00	
		2nd „	0·05	
October	„	1st „	*Nil.*	
		2nd „	*Nil.*	
November	„	1st „	*Nil.*	
		2nd „	*Nil.*	
December	„	1st „	·70	
		2nd „	*Nil.*	
January	1914	1st „	*Nil.*	
		2nd „	*Nil.*	
February	„	1st „	*Nil.*	
		2nd „	·06	
March	„	1st „	3·19	
		2nd „	·35	
April	„	1st „	·26	
		2nd „	·73	
May	„	1st „	·58	
		2nd „	*Nil.*	38·60

Staff.—The Farm was in charge of Mr. Ganpati Narain during the year and he carried out his work satisfactorily and zealously.

II.—Experimental Series.

SERIES A.—Trials of various methods of rice cultivation.

Area of each plot ... ·20 Acre.
Soil— ... *Sahra*
Object of experiment— ... Value of transplantation.

Plot No.	Class of rice sown.	Method of sowing.
Aa-1	Early paddy (Basmatia) ...	Broadcasted.
Aa-2	Do. do. ...	*Machaua.*
Ab-1	Medium paddy (Haradgundi).	Do.
Ab-2	Do. do. ...	Transplanted.
Ac-1	Late paddy (Gurmatia) ...	*Machaua.*
Ac-2	Do. do. ...	Transplanted.

Statement showing the outturn and profit and loss in Series A.

1912-13.

Number of plots.	Treatment (system of planting).	Outturn per acre.		Cost of cultivation per acre.	Value realized per acre.	Profit or loss per acre.
		Grain.	Other.			
		lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Aa-1	Broadcast ...	420	740	24 4 9	16 3 4	8 1 5
Aa-2	*Machaua* ...	1,480	1,910	25 13 9	54 3 4	28 5 7
Aa-3	Transplantation ...	1,255	1,220	14 14 4	44 4 10	29 6 6
Ab-1	*Machaua* ...	1,300	3,210	28 5 6½	67 8 8	39 3 1½
Ab-2	Transplantation ...	1,715	3,120	20 2 1½	84 7 4	64 5 2½
Ac-1	*Machaua* ...	2,485	5,510	27 0 1	100 9 10	73 9 9
Ac-2	Transplantation ...	1,875	3,225	22 11 4	72 0 6	49 5 2

1913-14.

Treatment (system of planting).	Outturn per acre.		Cost of cultivation per acre.	Value realized per acre.	Profit or loss per acre.
	Grain.	Other.			
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Broadcast ...	640	1,640	16 12 4	33 1 2	16 4 10
Machaua ...	840	1,640	18 8 8	41 6 6	22 13 10
Transplantation ...	1,110	1,380	23 4 8½	51 10 3	28 5 6½
Machaua ...	1,275	5,960	25 6 3	81 5 7	55 15 4
Transplantation ...	1,715	3,225	28 1 2	90 8 10	62 7 8
Machaua ...	1,190	4,485	21 0 8	63 4 8	42 4 0
Transplantation ...	1,680	2,750	25 6 8	75 5 8½	49 15 ½

This is only the second year of this experiment and therefore great reliability cannot be put on the results. However, single seedling transplantation appears to be more profitable than the local *machaua* system.

Machaua is the system used locally by which the land is puddled as for transplantation and germinated seed is broadcasted. The results obtained by this method are very favourable. It is preferred to the other system by reason of its cheapness, as the price of labour round Jubbulpore is very high.

SERIES B.—To test the value of green manuring with *san*-hemp and *tarota* on transplanted paddy.

Variety of paddy ... Late paddy (Dilbaksha).

Kind of soil ... *Domatta.*

Treatment.—Plot No. 1, area... ·50 acre no manure.

„ „ 2, area... ·58 acre green manured with *san*-hemp.

„ „ 3, area... ·36 acre green manuring with *tarota* 75 mds. per acre.

Plot No.	Produce per acre.		Value realized per acre.	Cost of cultivation per acre.	Profit per acre.
	Grain.	Other.			
1	2	3	4	5	6
	lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1 ...	960	1,750	50 7 6½	22 9 10	27 13 8½
2 ...	1,353	2,366	70 11 10½	30 15 8	39 12 2½
3 ...	1,278	2,064	62 2 5½	39 1 9	36 1 8½

The plots were unequally situated and the results are not altogether reliable. However, the plot manured with *san*-hemp has given a good working profit over the unmanured plot and although the *tarota* soiling has not been quite so profitable, it goes to prove that green manuring is worth the extra trouble and labour.

This experiment will be repeated next year on more evenly situated fields.

SERIES C.—Value of different manures on transplanted paddy Dilbaksha.

Area of each plot ... ·20 acre.

Treatment.—Plot No. 1 No manure.

„ „ 2 Poudrette manure ... 20 lbs. Nitrogen per acre.

„ „ 3 Cattle dung ... 20 „ do.

„ „ 4 Horse dung ... 20 „ do.

„ „ 5 *Karanj* cake ... 20 „ do.

„ „ 6 Bone dust ... 20 „ do.

„ „ 7 Sulphate of ammonia ... 20 „ do.

„ „ 8 { Do. ... 10 „ do. / Bone dust ... 10 „ do.

„ „ 9 Calcium cyanamide ... 20 „ do.

„ „ 10 *Mahua* refuse ... 20 „ do.

„ „ 11 Tank silt at ... 25 cart-loads per acre.

„ „ 12 Urine earth at ... 5 do.

C.—Series.

1912-13.							1913-14.					
No. of plot.	Treatment.	Outturn per acre.		Cost of cultivation per acre.	Value realized per acre.	Profit or loss per acre.	Treatment.	Outturn per acre.		Cost of cultivation per acre.	Value realized per acre.	Profit or loss per acre.
		Grain.	Other.					Grain.	Other.			
1	2	3	4	5	6	7	8	9	10	11	12	13
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.		Lbs.	Lbs.	Rs a. p.	Rs. a. p.	Rs. a. p.
1	No manure ..	850	1,385	24 10 7	41 3 0	16 8 5	No manure ..	530	1,730	22 12 9½	31 1 8½	8 4 11
2	Poudrette ..	1,202½	1,592½	33 5 11½	56 11 10	23 5 10½	Poudrette ...	1,220	3,170	33 0 4	67 13 4½	34 13 ½
3	Farm yard manure ..	1,200	1,755	27 10 6	57 5 0	29 10 6	Farm yard manure ...	1,300	2,780	28 5 6½	69 15 2	41 9 7½
4	Horse-dung ...	980	2,460	24 0 7	51 1 4	27 0 9	Horse-dung ...	1,035	1,825	30 3 9	54 2 10	23 15 1
5	Meagher system ...	1,265	1,935	25 12 11	60 12 4	34 15 5	*Karanj* cake ...	1,330	1,960	31 0 6½	68 1 9	37 1 2½
6	Bone-dust manure ..	1,520	2,390	56 9 5	74 2 0	17 8 7	Bone-dust ...	1,745	2,840	47 15 8½	90 6 8	42 6 11½
7	Sulphate of ammonia ...	735	1,785	40 1 8	38 1 0	—2 0 8	Sulphate of ammonia ..	460	1,430	36 13 9½	26 7 11½	—10 5 10
8	Sulphate of ammonia and bone-dust ...	1,250	2,165	50 6 8	61 1 8	10 11 0	Sulphate of ammonia and bone-dust...	840	3,085	46 1 1	50 3 9	4 2 8
9	Calcium cynamide ..	800	1,955	34 4 4	41 7 8	7 3 4	Calcium cynamide ...	730	1,795	35 7 8½	40 3 1	5 11 4½
10	*Mahua* refuse ..	1,355	1,110	27 15 6	61 1 4	33 1 10	*Mahua* refuse ...	540	1,280	26 8 2	29 8 9	3 0 7
11	No manure ...	855	1,240	24 11 5	40 12 8	16 1 3	Tank silt ...	805	1,420	27 14 ½	42 2 2	14 4 1½
12	Do. ...	1,505	2,125	25 8 4	71 9 0	46 0 8	Urine earth ...	1,310	1,985	25 15 10	67 4 10	41 5 0

In this experiment also the plots were uneven in character and the results are far from reliable.

The unevenness of the plots will be readily seen by comparing the results of the last two years. Bone-dust, urine earth and farm yard manure have given the best results, but *mahua* refuse which gave very good results last year, has not shown up at all.

SERIES D.—To compare the outturn of drill sown paddy with transplanted paddy.

Area of each plot—·20 acre.

Plot No.	Treatment.	Produce per acre.		Value realized per acre.	Cost of cultivation per acre.	Profit per acre.
		Grain.	Other.			
1	2	3	4	5	6	7
		lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Da-1	Kadamphul paddy drilled at 12" distance...	330	910	20 0 10½	20 5 0	0 4 1½
Da-2	Kadamphul paddy drilled at 9" distance...	295	815	17 14 11½	21 9 10	3 10 10½
Da-3	Kadamphul paddy transplanted ...	1,200	2,050	68 0 1½	22 2 4½	45 13 9
Db-1	Gurmatia paddy drilled at 12" distance ...	590	1,455	28 6 0	25 2 2	3 3 11
Db-2	Gurmatia paddy drilled at 9" distance ...	725	1,880	35 3 8	26 4 5	8 15 3
Db-3	Gurmatia paddy transplanted ...	1,020	2,835	50 4 10	25 5 10	24 15 0

Kadamphul is an early variety and Gurmatia is a late one.

Plots Nos.-Da 1 and Da-2 were late in being sown and their situations were also unfavourable. The value of transplantation is very marked in this experiment, although the results are not altogether reliable.

SERIES E.—To ascertain the most economical seedling rate for transplanted paddy with early and late planting out of the same nursery.

Kind of oil ... Sahra.

Area of each plot, variety sown ... ·20 acre, early paddy Kadamphul.

Plot No.	Treatment.	Produce per acre.		Value realized per acre.	Cost of cultivation per acre.	Profit per acre.
		Grain.	Other.			
1	2	3	4	5	6	7
		lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Ea-1	Single seedling ... Transplanted in the 1st week of July.	1,070	1,395	58 15 2	22 11 4	36 3 11
Ea-2	Double do. ...	1,170	1,530	64 7 7½	29 5 2	35 2 5½
Ea-3	Triple do. ...	1,270	1,730	70 4 1½	34 13 11	35 6 2½
Eb-1	Single seedling ... Transplanted in the end of July, i.e., three weeks after planting from the same nursery.	715	1,045	39 13 4	22 4 8	17 8 8
Eb-2	Double do. ...	730	1,145	40 14 2	27 15 11	12 14 3
Eb-3	Triple do. ...	835	1,595	47 15 8	33 15 4	14 0 4

The plots were not level and could not keep water in the upper portions, so that the results are not very satisfactory. These plots will be levelled next season. The above results so far prove that early transplantation is more profitable than late transplantation.

SERIES F.—Value of different manures on sugarcane.

Variety sown ... ... Ponda sugarcane.

Plot No.	Treatment.	Produce per acre.	Value realized per acre.	Cost of cultivation per acre.	Profit per acre.
1	2	3	4	5	6
		lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Farm yard manure at 35 cart-loads per acre *plus* Farm yard manure containing 50 lbs. nitrogen per acre.	1,08,293	593 0 6	268 13 8	324 2 10
2	Farm yard manure 35 cart-loads per acre *plus karanj* oil cake containing 50 lbs. nitrogen per acre.	75,544	414 1 0	269 6 5	144 10 7
3	Farm yard manure 35 cart-loads per acre *plus* Ammonium Sulphate 50 lbs nitrogen per acre.	69,294	375 7 8	301 15 0	73 8 8
4	Farm yard manure 35 cart-loads per acre *plus mahua* refuse 50 lbs. nitrogen per acre.	89,437	490 3 0	265 2 1	225 0 11
5	Farm yard manure 35 cart-loads per acre *plus* poudrette 50 lbs. nitrogen per acre.	*71,589	392 6 11	280 6 1	112 4 11
6	Farm yard manure 35 cart-loads per acre *plus* horse dung 50 lbs. nitrogen per acre.	64,879	355 8 2	304 11 0	50 13 2

* 0·04 acre was damaged by water-logging.

Area of each plot being

Plot No.		Acre.
1	...	·15
2	...	·16
3	...	·16
4	...	·19
5	...	·19
6	..	·19

These experiments will be continued next year.

III.—Variety of crops

CHILLIES.

No.	Name.	Area.	Actual outturn.	Value realized per acre.	Cost of cultivation per acre.	Profit per acre.	Remarks.
1	2	3	4	5	6	7	8
		Acres.	Md. S.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	Long wet chillies ...	·60	8 29½	169 14 10	58 14 4	111 0 6	This gives a comparatively small outturn in the first and second pickings, but later pickings yield enormously. It is greatly in favour for sowing on account of large size and outturn.
2	,, dry ,, ...	,,	1 34				
3	,, green ,, ...	,,	6 9½				
4	Medium wet ,, ...	·30	2 12½	71 0 7	55 6 6	15 10 1	Outturn less than long chillies, but liked in the market for size.
5	,, dry ,, ...	,,	0 20½				
6	,, green ,, ...	,,	1 14				
7	Round dry ,, ...	·27	1 16½	94 12 10	55 6 6	39 6 4	This gives a big outturn in the first two pickings, but very little later on. It is small in size, but being more pungent than the others, is in greater demand by the public.
8	,, wet ,, ...	,,	1 9½				
9	,, green ,, ...	,,	1 26				

GROUND-NUT.

No.	Name of crop.	Treatment.	Area in acres.	Outturn per acre in lbs.	Value realized per acre.	Cost of cultivation per acre.	Profit per acre.	Remarks.
1	2	3	4	5	6	7	8	9
			Acres.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	Raipur local ground-nut.	Manured with ash at 25 mds. per acre.	·50	2,342	195 2 8	50 0 6	145 2 2	The manured plot is giving remarkably good results.
2	Do. ...	Unmanured ...	·45	1,495	124 9 4	48 4 4	76 5 0	
3	Do. ...	Variety test ...	·29	1,265	105 6 8	52 0 9	53 5 11	Madagascar has given the best result, but it is a late variety like big Japanese and the pods are smaller in size than either Raipur local or Big Japanese.
4	Big Japanese ground-nut.	Do. ...	·30	1,523	126 14 8	53 4 0	73 10 8	
5	Madagascar ground-nut.	Do. ...	·32	1,765	147 1 4	52 1 4	95 0 0	
6	Small Japanese ...	Variety test Irrigated.	·12	1,316	109 10 8	55 14 5	53 12 3	The early varieties, small Japan and pea-nut seem to be almost equal in outturn and one irrigation to each of these seems to have decreased the outturn.
7	Do. ...	Variety not irrigated.	·06	1,383	115 4 0	49 11 10	65 8 2	
8	Spanish pea-nut ...	Variety test Irrigated.	·22	1,341	111 12 0	52 15 9	59 12 3	
9	Do. ...	Variety not Irrigated.	·18	1,444	120 5 4	51 1 7	69 3 9	

SWEET POTATOES.

No.	Name of variety.	Area in acres.	Outturn per acre.	Value realized per acre.	Cost of cultivation.	Profit per acre.	Remarks.
1	2	3	4	5	6	7	8
		Acres.	Mds. Srs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	Sweet potatoes, Nasinghpur, broad lobed red.	·054	48 6	77 0 7	66 13 0	10 3 7	
2	Sweet potatoes, Narsinghpur, broad lobed white.	·09	57 33	92 8 3	66 13 0	25 11 3	Do well as a second crop in sandy soils. Of the varieties tested, Nos. 3, 6 and 7 are good yielders and they will be profitable to grow on light sandy soils commanded by irrigation.
3	Sweet potatoes, Narsinghpur, narrow lobed red.	·15	91 7	145 14 1	66 13 0	79 1 1	
4	Sweet potatoes, Narsinghpur, narrow lobed white.	·09	60 22	96 14 1	66 13 0	30 1 1	
5	Sweet potatoes, Jubbulpore, red ...	·045	53 2	84 14 1	66 13 0	18 1 0	
6	Do. do. white ...	·09	88 13	141 9 1	66 13 0	74 12 1	
7	Sweet potatoes, Mandla, white ...	·12	87 8	139 3 7	66 13 0	72 6 7	

TURMERIC.

Area sown.	Outturn per acre.	Value realized per acre.	Cost of cultivation per acre.	Profit per acre.
1	2	3	4	5
Acres.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
·26	9,153 wet weight.	288 7 5	242 4 0	46 3 7

The actual wet weight of turmeric in ·26 acre was 2,400 lbs.; 800 lbs. has been reserved for seed and the remaining 1,600 lbs. was boiled yielding 4 maunds 30 seers dried material. Hence the value has been calculated as under:—

		Rs.	a.	p.
800 lbs. green turmeric, worth	...	36	8	0
4 maunds 30 seers dry turmeric, worth	...	38	8	0
Total	...	75	0	0

Statement showing paddy varieties grown on the Adhartal Farm during the year 1913-14.

No.	Name of crop.	1912-13.	1913-14.		
		Produce per acre.	Produce per acre.	Area under each variety. Non-experimental.	Area under each variety. Experimental.
1	2	3	4	5	6
		lbs.	lbs.	Acres.	Acres.
1	Kadamphul ...	853	1,042	2·57	·80
2	Nasik early ...	940	724	1·86	...
3	Basmatia ...	417	923	·95	·60
4	Dilpasand ...	739	818	2·00	...
5	Ranikajar ...	1,117	1,026	·23	...
6	Haradgundi ...	1,507	1,257	·37	·40
7	Dantsari ...	1,406	2,200	·15	...
8	Maknuja ...	1,190	708	·26	...
9	Eklombi ...	2,375	1,030	·58	...
10	Dilbaksha ...	1,505	912	2·25	3·84
11	Bhonda ...	1,812	1,219	·16	...
12	Bhojachinga ...	1,133	600	·20	...
13	Sarmod red ...	1,650	707	·13	...
14	Tulsibas ...	228	847	·34	...
15	Gurmatia ...	...	724	1·82	1·00
16	Krishnabhog ...	466	657	·40	...
17	Tulsimanjri ...	773	408	·24	...

Kadamphul, Nasik early, Basmatia, Dilpasand, Ranikajar, are early varieties and fairly good yielders. Hardgundi and Eklombi are medium varieties, and all the rest are late. The demand for early varieties is increasing, and they have become very popular with the cultivators.

Statement showing the yield of different varieties of paddy tried on the Adhartal Farm during the year 1913-14.

No.	Name of variety.	Area sown in acres.	Outturn in lbs.	Outturn per acre in lbs.	Remarks.
1	2	3	4	5	6
1	Katia paddy ..	·132	116	803	Late.
2	Gangi Kudo paddy ...	·076	82	1,079	Early.
3	Lonchinga ,, ...	·09	115	1,277	Late.
4	Kodon Malti ,, ...	·33	205	621	Early.
5	Ramsali ,, ...	·335	225	672	,,
6	Hardgundi paddy No. 12 ...	·105	240	2,285	Medium early.
7	Bahia Bikoni paddy ...	·10	160	1,600	Late.
8	Eklombi paddy No. 13 ...	·136	133	978	,,
9	Lalia paddy No. 85 ...	·09	95	1,044	,,
10	Lalia paddy No. 86 ...	·102	120	1,176	,,
11	Kapurkali paddy ...	·09	55	611	Late. Very poor outturn.
12	Vishnubhog paddy ...	·355	321	904	Late.
13	Mundi Kathi paddy ...	·084	165	1,964	,,
14	Bhonda paddy No. 11 ...	·093	143	1,537	,,
15	Molar paddy ...	·09	158	1,755	,,
16	Chinnor paddy ...	·045	64	1,422	,,
17	Parewa ,, ...	·11	147	1,336	,,
18	Ramkel ,, ...	·057	95	1,418	,,
19	Ramjiwan ,, ...	·355	283	797	,,
20	Tulsibhog paddy ...	·042	20	476	,,
21	Sonkircha ,, ...	·26	198	761	Latest.
22	Jogeswar ,, ...	·056	50	893	,,
23	Tulsi Amrit ,, ...	·44	75	170	Late, fine, suffered much on account of drought.

Out of the varieties grown during the current year Maknuja, Eklombi, Jogeswar, Vishnubhog, Tulsibas, Chinnor, Parewa, Dilbaksha, Mundikathi, Molar, Hardgundi, Bahia Bikoni, Krishnabhog, Kodomalti and Dantsar are found to be the best yielders and will be given further trial next year. The rest being late in ripening and poor in yield have been rejected.

Statement showing the results of pulses and other crops grown on the Adhartal Farm during the year under report.

Name of crop.	Area sown in acres.	Outturn per acre in lbs.	Remarks.
1	2	3	4
Til sown by drill as compared to broadcasting.			
White Kharif *til*	·32	330	Sown by clipper drill.
,, ,, ...	2·00	118	Broadcasted.
Other til varieties.			
Sim Sim abiad *til*	·33	333	Propagated as second crop after paddy nursery.
Sim Sim red *til*	·22	55	Do. do.
Kharif pulses.			
Yellow *mung*	1·23	337	Sown by clipper drill.
Green *urid*	·80	165	Do.
Gram varieties.			
Local gram	·52	877	
Malida ,, ...	2·68	970	
Kasbuli ,, ...	·14	214	
Pusa ,, 5-*b*	·50	140	
,, ,, 5-*a*	·38	416	
Gram D-1	·094	1,170	Good colour, white milky and good yielder.
,, D-2	·03	533	
,, D-4	·01	400	
,, D-5	·02	500	
,, D-6	·01	600	
,, D-7	·01	1,200	
,, D-8	·09	667	Colour good rosy, of new type.
Soybean varieties.			
Poona No. 9	·10	70	Round flat, pale green seed early.
,, No. 18	·04	75	Round white seed, early.
Mammoth soybean	·02	100	Large white seed.
Java black seeded	·065	215	Late.
Soybean No. 4359	·032	33	Late green seeded.
,, No. 4355	·08	50	,, brown ,,
Nagpur late soybean	·25	...	Very late
			The soybeans were tried on a very small scale and further trial will be given to all as they are very useful to grow on light soils.
Linseed varieties.			
White linseed No. 42000 ...	·05	540	The seed was received from Nagpur and was sown in the first week of October at the rate of 12 lbs. per acre. Nos. 1, 2 and 3 (the first three) have given good outturns. The rest were sown on very uneven and badly situated land with a consequent poor yield. They will be tried next year.
Red ,, ,, 550000 ...	·05	400	
White ,, ,, 172001 ...	·05	400	
Red ,, ,, 520001 ...	·05	260	
,, ,, ,, 230001 ...	·05	240	
,, ,, ,, 2300300 ...	·05	120	
Oats.			
Oats	·27	763	Seed procured locally. This has proved successful as a double crop on *domatta* land.
Fodder.			
Yeora	·70	512	
Berseem	1·50	2,800	Grown as second crop after paddy.
Lucerne	·43	2,316	

Statement showing the yield of different varieties of wheat tried on the Government Experimental Farm, Adhartal, during the year under report.

No.	Variety of wheat.	Area sown in acres.	Outturn per acre, lbs.	Remarks.
1	2	3	4	5
1	Bansi wheat ..	·30	904	Nos. 1 to 11 were sown to test the outturn of each. Pusa Nos. 100 and 59 have shown unsatisfactory results, while of the rest A-088, Hansi, Bansi and Muriya, &c., have done well. A-080, P-4, A-088, A-068 are early wheats. Sardar X Zuff is an awnless wheat and can be substituted for Mundi, which is a poor yielder and very susceptible to rust when grown in bandhwas. The remaining wheats were sown on a very small area and were intended for propagation.
2	Pusa wheat No. 4 ...	·30	704	
3	Muriya wheat ...	·30	803	
4	A-080 wheat * ...	·30	666	
5	Pusa wheat No. 100 ..	·23	478	
6	Hansi pissi * ...	·50	605	
7	Sardar X Zuff ...	·20	1,020	
8	Pusa wheat No. 59 ...	·13	461	
9	A-068 wheat ..	·10	800	
10	A-088 ,, ...	·19	990	
11	A-089 ,, ...	·115	974	
12	A-090 ,, ...	·174	1,240	
13	Firbank ,, ...	·094	755	
14	Cedar ,, ...	·030	132	
15	Warren ,, ...	·012	500	
16	A-112 ,, ...	·008	400	
17	A-113 ,, ...	·006	300	
18	A-114 ,, ...	·010	300	
19	A-115 ,, ...	·01	100	

* A patch of ·10 acre failed to germinate and Malida gram was sown in its place. The outturn is good and the variety is specially suited for *domatta* wheat lands.

The sugarcane varieties were analysed on the Farm by the Agricultural Chemist (Mr. F. J. Plymen), and the results of his analysis are given in the following statement:—

No.	Variety.	Date of planting.	Date of crushing.	Percentage of juice in stripped canes.	Degree brix-apparent total Solid percentage.	Degree brix-corrected to 20° C.	Percentage of sucrose in juice.	Percentage of glucose in juice.	Coefficient of purity.
1	2	3	4	5	6	7	8	9	10
1	Pachrang ...	25th December 1912	12th December 1913 ...	73·9	17·1	17·16	14·79	1·27	86·5
2	Sarareo ...	Do. ...	Do. ..	61·8	18·35	18·41	15·18	1·09	82·7
3	Ashy Mauritius ...	Do. ...	15th December 1913 ...	72·6	18·9	19·09	17·03	·94	90·1
4	Striped Mauritius .	26th December 1912 ...	Do. ...	73·6	18·7	18·89	16·78	1·06	89·7
5	Dhor of Harrai ...	27th December 1912 ..	Do. ...	66·7	19·05	19·17	16·95	0·72	85·0
6	Sennabii ...	14th January 1913 ..	Do. ...	67·00	18·75	18·87	16·80	·70	89·6
7	Saratha ...	Do. ...	Do. ...	63·4	18·3	18·36	15·75	·35	86·00
8	Kharl ...	Do. ...	14th December 1913 ...	67·3	18·05	18·05	16·17	·73	89·60
9	Dhor of Seoni (all dried canes).	Do. ..	Do. ...	48·5	18·9	18·9	10·07	4·64	53·3
10	Bansia (Bulk crushing) ...	27th December 1912 ...	Do. ...	78·2	15·45	15·51	12·53	1·70	81·1
11	Barahi ...	9th January 1913 ...	Do. ...	63·6	18·3	18·3	15·15	·90	82·8
12	Karia (Bulk-crushing) ..	25th December 1912 ...	Do. ...	62·5	19·00	18·82	16·58	·98	87·3
13	Harrai Ponda (Bulk-crushing) evening.	Do. ..	15th December 1913 ...	78·00	17·6	17·29	14·19	1·39	80·6
13-A	Do. morning ...	Do. ...	16th December 1913 ..	73·00	17·4	17·00	13·82	1·60	79·4
14	Gungeron (Bulk-crushing.)	Do. ...	Do. ...	72·6	17·55	17·43	15·13	·64	86·2
15	Pundia (Bulk-crushing) ...	Do. ...	Do. ...	72·9	14·6	14·74	10·50	2·13	71·9
15-A	Bad canes (Pundia) ...	Do. ...	Do. ...	*Nil*	8·4	8·3	·28	5·14	3·4
16	Barahi (Bulk), morning ..	Do. ..	13th December 1913 ..	...	16·8	17·02	13·95	·98	82·8
16-A	Do. evening ...	Do. ...	Do. ...	...	17·85	17·85	14·38	·98	80·6
	MANURIAL SERIES PONDA.								
1	Farm yard, manure ...	28th December 1912 ...	15th December 1913 ...	75·7	15·7	15·94	13·18	1·34	
2	*Karanji* cake ...	Do. ...	Do. ..	79·7	16·10	16·36	14·52	1·17	
3	Amonium, Sulphate ...	Do. ...	Do. ...	78·3	18·85	18·91	16·92	·85	
4	*Mahua* refuse ...	Do. ...	Do. ...	77·00	18·3	18·42	16·32	·91	
5	Poudrette ...	Do. ...	Do. ...	78·00	16·7	16·94	14·14	1·31	
6	Horse-dung ...	Do. ...	Do. ...	77·3	18·4	18·52	16·40	·89	

Statement showing the valuation of grain and other produce of the Adhartal Farm for the year 1913-14.

Particulars of produce.	Amount.	Total.
1	2	3
	Rs. a. p.	Rs. a. p.
Paddies...	1,138 11 0	...
Groundnut varieties	650 0 0	...
Til varieties	34 8 0	...
Maize	15 10 9	...
Urid and mung	40 8 0	...
Sim Sim varieties	8 0 0	...
Potato varieties	108 10 0	...
Chillies and turmeric	237 14 10	...
Sugarcane and gur	799 0 0	...
Wheat	431 4 6	...
Gram	183 1 0	...
Oats	26 0 0	...
Cotton, linseed and peas	23 0 0	3,676 4 1
Fodder—		
Lucerne and Berseem	270 15 0	...
Green grass	43 10 9	...
Maize fodder	20 0 0	...
Sugarcane fodder	5 7 0	
Green teora	13 11 0	...
Dry grass	405 7 6	...
Paddy straw and bhusa	330 8 0	1,089 11 3
Implements prepared on the Farm—		
Wood-work for Meston and Monsoon ploughs ...	76 12 0	...
Ironwork for Meston and Monsoon ploughs ...	8 12 0	...
Daura, Dundia, Arjara and ridging ploughs ...	56 10 0	42 2 9
Other miscellaneous receipts—		
Milk, garden produce, &c.	135 3 8	135 3 8
Grand Total		5,043 5 0

Statement showing the details of cropping during the year 1913-14.

Crops.	Area in acres.	Crops.	Area in acres.
Experimental.		*Double cropping.*—(Concld).	
		Brought forward. ...	1·64
Sugarcane	1·04	Paddy by oats	1.50
Paddy varieties	7·64	Do. Berseem	2·00
	8·68	Do. Saftal	0·45
Non-experimental Kharif.			5·59
Paddy sewa broadcast	1·25	*Non-experimental Rabi.*	
Do. Machaua	2·15	Bansi wheat	2·32
Do. Drill	0·10	Hansi pissi	3·37
Do. Transplanted ...	14·573	Muriya wheat	2·86
Cambodia cotton	0·15	A-012 wheat	0·79
Other cotton varieties	0·60	Pusa No. 4	0·58
Groundnut ...	7·01	Other wheat varieties	2·04
Yellow mung	0·93	Pusa grams 5-*a* and 5-*b*	0·88
Green *urid*	0·80	Malida gram	2·68
White *kharif til*	2·32	Kabuli gram	0·14
San-hemp	1·32	Khandwa gram	0·62
Soybean	0·62	Local gram	0·52
	31·823	Gram varieties	0·26
Garden crops.		Linseed varieties	0·40
Long chillies	0·60	Oats	0·52
Medium chillies	0·30	Barley	0·25
Round chillies	0·27	Peas	0·38
Turmeric	0·26	Teora as fodder	0·26
Sugarcane varieties	0·90		18·87
	2·33	*Abstract.*	
Double-cropping.		Experimental *kharif*	8·68
Soybean followed by *sarson* ...	0·16	Non-experimental *kharif* ...	31·823
Maize by sweet potatoes	0·70	Garden crops	2·33
Maize by potatoes	0·15	Non-experimental *rabi*	18·87
Sim Sim abiad *til* by lucerne ...	0·33	Total cultivated area	61·703
Sim Sim red *til* by Berseem ...	0·20	Roads and buildings	7·62
Ghuiyan by *sarson*	0·10	Fallow area	30·55
	1·64	Grazing and grass reserve ...	41·84
		Total area of the Farm ...	141·71

Statement showing the distribution of seeds from the Government Experimental Farm, Adhartal, during the year 1913-14.

Variety of seed.	Quantity supplied. lbs.	Total. lbs.
1	2	3
Paddies—		
Kadamphul paddy	5,455	...
Basmatia paddy	1,034	...
Nasik Early	1,859	...
Dilpasand paddy	1,246	...
Ranikajar	223	...
Harad Gundi	653	...
Kotia paddy	100	...
Gangi kudo paddy	44	...
Lonchinga paddy	44	...
Kodon malti paddy	160	...
Ramsali paddy	191	...
Bahia bikoni paddy	106	...
Maknuja paddy	112	...
Eklombi paddy	555	...
Dilbaksha paddy	5,315	...
Vishnubhog paddy	261	...
Mundi kathi paddy	48	...
Bhonda paddy	336	...
Molar paddy	77	...
Chinnor paddy	40	...
Bhojachinga paddy	100	...
Sarmod red paddy	36	...
Parewa paddy	36	...
Tulsibas paddy	171	...
Gurmatia paddy	2,172	...
Ramjiawan paddy	253	...
Tulsibhog paddy	20	...
Krishnabhog paddy	198	...
Sonkircha paddy	120	...
Tulsimanjri paddy	50	21,015
Wheats—		
Hansi Pissi	80	...
Bansi wheat	4,082	...
Pusa No. 4 wheat	50	...
Muriya wheat	80	4,292
Gram—		
Malida gram	1,144	1,144

Variety of seed.	Quantity supplied lbs.	Total lbs.
Groundnuts—		
Madagascar groundnuts	209	...
Big Japanese groundnuts	2,867	...
Small Japanese groundnuts	831	...
Spanish peanut	263	...
Raipur local groundnuts	3,465	7,635
Sugarcanes—		
Khari canes	No. 900	...
Ashy Mauritius	„ 200	...
Sannabilli canes	„ 500	1,600 (No.)
Miscellaneous—		
Jaunpur Maize	64	...
Green *urid*	85	...
Brown *urid*	3	...
Bajra	4	...
Chaulai	6	...
Yellow *mung*	49	...
Sim Sim abiad *til*	21	...
White Kharif *til*	91	...
Deshi *tur*	50	...
Unao *tur*	19	...
Turmeric	362	...
Sann seed	200	...
Soybean	29	...
Round chillies	6	...
Long chillies	4	...
Medium chillies	2	995

IV.—Implements and Machines—trials of Machines.

Monsoon plough.—Found to be a most useful plough for breaking up fallows and ploughing wheat fields. It also eradicates "*kans*" to a depth of 7" to 8" and has proved quite successful in haveli land.

Meston plough.—A useful plough for the cultivation of "*sehra*" and "*domatta*" lands for paddy cultivation. The new pattern received from Messrs. Octavius Steel & Co. is a decided improvement, the draught being very little and the strain on the bullocks consequently small.

Spring toothed harrow.—With five tines, cost Rs. 40. This was tried in place of bakhar on domatta soil and wheat land. The work done is trebled and is quite as satisfactory.

Deshi huller (konkon mill).—Price Rs. 25. The work of this mill is good, but about 8 per cent paddy is left with the rice and requires cleaning. The outturn per day is 1,000 lbs., which is much better than *kuneta* and less expensive.

Burn & Co.'s huller.—Price Rs. 150. This gives an outturn of 400 lbs. per day of good polished rice. No *dhan* is left and grains are not broken; worked by hand power. The rice hulled by this machine fetches a higher price than konkon and Deshi kuneta mills.

A. A. Type fodder cutters (Burn & Co.'s).—Price Rs. 45. This is suitable for cutting green and dry fodder of juar, maize and bajra.

Narbudda Reaper (of Messrs. John Wallace & Co., Glasgow).—The new improved design, costing Rs. 236, is suitable both for grass and wheat harvesting. 5 to 6 acres per day can be cut by the machine.

Beloo Reaper.—Intended for paddy, was also tried. It is heavy for the animals and the machine is bulky. The firm has been requested to have it improved to suit Central Provinces conditions.

Mills and Pans.—From the sugarcane mills tried on the Farm, Burn & Co.'s two roller mill with iron top and bottom and the Nahan two roller mill are suitable for thin canes. The latter is in great demand. The Nahan three rollered mill is one of the most efficient types, yielding 74 per cent juice from thick canes.

The shallow pans of the Poona pattern are most suitable, as less fuel is required by using them on the improved furnace. The quality of *gur* is much superior and the outturn is greater.

Ideal woven wire fencing—Is very useful for jungly tracts and will soon repay the cost. A roll of 220 yards costs Rs. 120.

Dredgers.—A levelling implement much in demand for levelling the *khanti* of fields and other uneven areas. These are made at the Reformatory School, Jubbulpore.

Bon-Accord winnower.—A new machine for winnowing wheat. It is intended for grading wheat only and has been found unsuccessful in separating wheat and gram, a very favourite mixture in some districts. Its price, Rs. 190, is also prohibitive.

The following Statement shows the number of machines sold from the Adhartal Farm during the year 1913-14.

No.	Name of implement or machine.	Number sold.	Price.	Total.
1	2	3	4	5
	From Implement Depôt.		Rs. a. p.	Rs. a. p.
1	Monsoon ploughs	308	3,313 4 10	
2	Do. spare shares	36	24 5 11	
3	Do. do. points ...	183	46 2 4	
4	Nahan Wakil mills	19	1,134 0 4	
5	Dredgers	8	96 0 0	
6	Iron motes	7	59 8 0	
7	Cawnpur maize shellers ...	1	0 13 9	
8	Poona mills	2	352 12 0	
9	Cross bar No. Mon 50	34	39 13 8	
10	M. S. N. ploughs	153	811 9 0	
11	Bolts and nuts for M. S. N. ploughs ...	53	10 3 5	
12	M. S. N. plough shares	86	46 0 9	
13	Monsoon plough slades	2	4 11 0	
14	Nahan Sultan Mills	2	239 9 4	6,178 14 4
	Burn and Company's Machines.			
15	Meston ploughs	95	409 10 2	
16	Do spare shares	84	22 10 3	
17	Hand cultivators	19	258 0 9	
18	Fodder cutters	4	183 6 8	
19	Pitcher spout pumps	7	136 6 0	
20	Spanners	2	0 0 3	
21	Two roller sugarcane mills	1	60 10 0	
22	C. I. Handle of P. Spout pumps ...	2	5 8 0	
23	Plough for hand cultivator	1	4 7 10	

No.	Name of machine of implement.	Number sold.	Price.	Total.
1	2	3	4	5
			Rs. a. p.	Rs. a. p.
24	Shares for big Turn-wrest plough ...	1	1 13 10	
25	Shares for Hindustan plough ...	1	4 0 0	
26	Hindustan plough ...	1	13 9 6	1,100 15 0
	Prepared on the Farm and sold.			
27	*Argara* ...	4	12 0 0	
28	Sindh ridging plough ...	4	24 0 0	
29	*Dawra* ...	7	7 14 0	
30	*Dundia* ...	7	8 12 0	
31	Handles and beams for Monsoon ploughs ...	60	60 0 0	
32	Handles and beams for M. S. N. and Meston ploughs ..	46	34 8 0	
33	Pins for Monsoon ploughs ...	26	0 6 6	
34	Stirrup bolts and nuts for Monsoon ploughs ...	22	8 4 0	
35	Long bolts for Monsoon ploughs ...	19	2 6 0	
36	Short bolts for Monsoon ploughs ...	22	2 1 0	
37	Stirrup bolts for Meston and M. S. N. ploughs ...	14	3 8 0	163 11 6
	Grand Total ...	...	...	7.443 8 10

V.—Receipts and Expenditure.

Receipts.—Rs. 2,846-8-7 were credited into the Treasury as receipts during the year under report against Rs. 1,500 the estimated figure, and the progress is very satisfactory.

Expenditure.—The contingent expenditure amounts to Rs. 9,120-3-5 during the year under report and it includes the following unusual expenses:—

	Rs. a. p.	
Furniture for Rest-house ...	1,184 5 11	
Purchase of land	1,239 0 0	
Construction and repairs of roads and Irrigation.	536 0 0	for irrigation tank.
Do. do. ...	200 0 0	for pipes.
Wire fencing	333 4 0	
Total ...	3,492 9 11	

Many of the *kamdars* and servants paid from contingencies are largely employed for demonstration work and are absent from the Farm for considerable time; so the item Rs. 3,258-10-3 under the head 'Servants paid from contingencies' is abnormally high.

Statement showing the receipts and expenditure of the Adhartal Farm during the year under report.

Heads.	Amount.			Total.		
1	2			3		
	Rs.	a.	p.	Rs.	a.	p.
Receipts.						
Commercial sale of produce	1,200	3	2			
Distribution of seed	991	0	10			
Miscellaneous	655	4	7			
				2,846	8	7
Expenditure.						
Charges for seed grain	329	6	8			
Farm buildings	116	10	0			
Construction and repairs of roads and Irrigation	874	10	6			
Purchase of cattle and implements	781	12	5			
Feed and care of cattle	343	4	8			
Manure	256	15	6			
Servants paid from contingencies and variable labour	3,258	10	3			
Wire fencing	333	4	0			
Service postage and telegram charges	87	0	0			
Stationery purchased locally	0	15	9			
Carriage of stationery and conveyance of forms	10	3	0			
Purchase of land	1,239	0	0			
Rest-house furniture	1,184	5	11			
Miscellaneous	304	0	0			
				9,120	3	5

APPENDIX II.

Report on the short courses of instruction in Practical Agriculture on the Adhartal Farm, 1913-14.

During the year under report 14 private students and eight candidates for posts of *kamdar* attended the short courses of instruction at the Adhartal Farm.

The private students remained under training, mostly at the time of transplanting, but joined the Farm again at various times during the year.

Out of the candidates for Kamdarship two—Dal Singh and Saryu Prasad—have been appointed in Patan Tahsil in charge of Demonstration work. The remainder are still at work on the Farm in completing the course of training.

The subjects of the short courses were as follows, and were distributed among the Farm staff:—

(1) *Manures.*—The pitting of Farm yard manure. The dry earth system of conserving urine. Green soiling. Oil cake (for canes). Sheep folding. Night-soil manuring and ash as manure.

(2) *Tillage implements.*—Monsoon plough and *kans* eradicating ploughs. The necessity for deep tillage. Cultivation of land for different crops. Different weeding hoes and their uses.

(3) *Sowing and winnowing implements.*—*Argara* and other seed drills, winnowers, etc.

(4) Hay making and the necessity for cutting grass before the formation of seed. Other fodders suitable for Farm animals. Reaper and its use in cutting grass and wheat.

(5) Sugarcane and other garden crops. Different systems of planting and suitable labour saving implements for furrow making. *Gur* making and knowledge of the parts of different kinds of iron mills. Improved furnace and economy of fuel. Diseases of canes, prevention and cure.

(6) *Wheat.*—Varieties suited for different soils. The importance of pure and sound seed. Seed Farm rules and germination tests. The proper time for sowing, disadvantages of late sowing. Wheat diseases—rust, smut, etc.

(7) *Kharif.*—Groundnut cultivation. Early cotton and other late varieties for observation. Points necessary for good kinds of cotton. Transplantation and importance of single seedlings. Rotations with different kinds of crops.

(8) Feed and care of cattle.

Practical work was done in the morning and lectures were delivered in the afternoon for two hours daily.

The following statement gives the details of students who attended the short courses of instruction:—

Places from which the students came.	Number attended.
Government *kamdars*	8
Mandla	3
Jubbulpore	5
Seoni	2
Damoh	2
Narsinghpur	1
Nagpur	1
Total ...	22

Report on Cattle-breeding Farm, Powarkhera, for the year 1913-14.

BY

G. EVANS, ESQUIRE, M.A.,

DEPUTY DIRECTOR OF AGRICULTURE, NORTHERN CIRCLE, JUBBULPORE, CENTRAL PROVINCES.

This Farm adjoins the Experimental Farm proper and is under the management of the same Superintendent.

The area is 264 acres, of which 55 acres is grass *bir*. The herd consists of pure Malvi cattle and the bulls are sold for stud purposes. Five young bulls were sold at Rs. 100 each to selected malguzars who wished to start cattle-breeding farms of their own under the supervision of the Department. The demand for bulls is so keen and the improvement in the stock so marked, that the prices will next year be raised.

A careful survey of the herd shows that the descendants of three of the original herd are all of exceptional merit and are of the particular type we want. These three families are known as Gori, Jamuna and Maroni, and they are now represented in the herd by 13 cows and heifers. It is intended to breed from these three families only in future.

The young stud bull No. 15 did not prove a successful stock getter and he was replaced by No. 18 who was also bred on the Farm.

Health of the herd.—Hæmorrhagic septicæmia broke out in the neighbouring village herds in August, and in spite of every precaution one calf died of this disease on 21st August. Inoculation against this disease was carried out by the Veterinary Inspector in the third week of September, and in spite of its continued prevalence in the neighbourhood no more deaths occurred on the Farm from this epidemic.

The heifer herd was infected with foot and mouth disease in the third week of January 1914. Disinfection and stringent isolation were reverted to at once, and although every individual in the herd was infected this disease did not spread to the rest of the Farm cattle.

Experiments were carried out by the Veterinary Department Staff in spraying against ticks in August.

Casualties.—In addition to the calf which died of hæmorrhagic septicæmia another calf was lost through premature birth.

Fodder, &c.—Grazing was good but the hay crop was a light one owing to the abnormal season.

Statement showing the receipts and expenditure of the Cattle-breeding Farm, Powarkhera, for the financial year 1913-14.

Heads.	Amount.
Receipts	Rs. a. p.
Sale proceeds of cattle ...	895 0 0
Sale proceeds of grass, milk, &c. ...	115 5 2
Total ...	1,010 5 2
Expenditure.	
Servants paid from contingencies ...	359 4 5
Feed and care of cattle ...	826 7 0
Buildings and fencing ...	138 2 7
Miscellaneous ...	181 7 0
Total ...	1,505 5 0

Statement showing casualties on the Cattle-breeding Farm, Powarkhera, from 1st July 1913 to 31st May 1914.

Description	Balance on 1st July 1913	Receipt.			Issues.				Balance on 31st May 1914.	Remarks.
		Births.	Otherwise, transfer, etc.	Total.	Deaths.	Sale.	Transfer, etc.	Total.		
Cows ...	23	...	7	30	...	...	...	...	30	
Cow calves at foot...	3	12	...	15	...	...	3	3	12	
Bull calves at foot ..	11	15	...	26	3	...	10	13	13	
Heifers ...	12	...	3	15	...	...	7	7	8	
Bulls .	17	...	10	27	...	10	...	10	17	
Total ..	66	27	20	113	3	10	20	33	80	

Report on Agricultural Demonstration in the Nerbudda Division for 1913-14.

1.—INTRODUCTORY.

This report gives a brief account of the operations of the Agricultural Department in this Division apart from the Experimental Farm, Powarkhera, which is published as a separate report.

2.—DEMONSTRATION FARMS.

Khandwa.—Demonstrations of improved varieties of cotton, *juar*, *bajra*, and groundnut were carried out on land belonging to Ramlal, Malguzar of Bhandaria, Totaram Patel of Khandwa, and in the field area of the Public Gardens.

The land at the first two plots was thin and badly prepared and unmanured. As a result the crops were indifferent and in addition could not be sown early as the monsoon at Khandwa was late in arriving.

The results are given below :—

Name of plot.	Crop.	Area in acres.	Outturn per acre in lbs.	Remarks.
Totaram Patel's at Khandwa ...	Rosea cotton ...	7	160	Ten days later than local cotton.
Do. ...	Malvensis cotton...	1	120	Growth was stunted ; flowers earlier than Rosea.
Do. ...	Ramkel *juar* ..	3	300	Suffered from drought and defective germination.
Do. ...	Natal *bajra* ...	2	100	The flowers were washed away by rain.
Ramlal Patel's at Bhandaria ...	Rosea cotton ...	20	100	The plot was badly prepared and had kunda patches.
Do. ...	Malvensis cotton ...	½	80	Poor out turn.
Do. ...	Ramkel *juar* ...	3	600	...
Do. ...	Marwari *bajra* ...	½	100	Sown on very poor soil.
Public Garden at Khandwa ...	Rosea cotton ...	¾	260	A fair crop.
Do. ...	Small Japanese groundnut.	¼	1,120	Good crop.

Rosea has given better results than Malvensis; and Ramkel *juar* is likely to prove a useful variety. The small Japanese variety of groundnut is particularly easy to harvest and should prove a great improvement on the Deshi variety, both in this respect and in yield.

Babai (District Hoshangabad).—Demonstration of the sowing of groundnut and cotton in lines and of the new variety of Maghai *til* called Purvi were carried out by means of a *Kamdar*, the malguzar promising to provide the labour in return for the profits. The area under the *til* crop originally was 220 acres, but owing to bad conditions of rainfall and later on due to insect attacks only 175 acres was left. The average outturn was reported to be 260 lbs. per acre against 220 lbs. per acre of the local *til*. The demonstration plot of groundnut at Babai was not well managed, the total outturn per acre being only 300 lbs. The malguzar failed to carry out his part of the contract, and as a result the land was not prepared properly, the seed was sown late, and weeding not properly attended to. As a result it has been decided to transfer the demonstrations to a more hospitable quarter.

The small Japanese groundnuts and Purvi *til* are being introduced fairly rapidly into this tract.

Rondha Union Farm (*District Betul*).—This Farm was started last year by the Betul Agricultural Union, which is affiliated to the Central Bank. The Farm was supervised by a Board of three malguzars who are members of the Union and who were appointed by the Deputy Commissioner. The working of the Farm was managed by a trained Jamadar in the service of the Agricultural Department, who did very well. A large number of different varieties of wheat, gram, &c., were tested on a considerable scale, and in spite of the unfavourable season some interesting results were obtained, which should prove of value to the district.

Small Japanese groundnut gave a fair crop and was followed by Bansi wheat under irrigation, which gave a really good outturn.

The following table gives the outturns of different varieties of seeds on the Rondha Union Farm :—

Name of crop.	Area sown in acres.	Outturn per acre in lbs.
Deshi gram	·62	833
Deshi pissi	6	341
Nawapur pissi	36·29	389
Sukerhai pissi	34	404
P-4 wheat	2	225
Hansi pissi	6	205
A-049 wheat	2	187
A-050 ,, ...	2	236
Jalalia wheat	4	295
Bansi wheat	9·82	397
Groundnut	3·72	415
Kabuli gram	6·64	229
Malida gram	9·23	303
Nimar gram	6	383
Pusa 5-a gram	2·08	288
Pusa 5-b gram	2·08	269
White linseed	9·78	229
Red linseed	9·78	234
Local peas	3·18	449
Khaperkheta peas	0·80	875
Acclimatised peas	3·16	443

Chaurai Demonstration plot (*District Chhindwara*).—A plot of about fifteen acres was laid out and used to test different kinds of wheat, the work being carried out by a Kamdar with the co-operation of the members of the local Agricultural Sub-Association. The season was not favourable but considerable interest was taken in the plots by the members.

Variety sown.	Outturn per acre in lbs.	
Haura wheat ...	323	Durum wheats.
Tigharia wheat ...	328	
Bansi wheat ...	309	
Local kathia ...	330	
Hansi pissi ...	355	
A-012 ...	360	
A-049 ...	402	
A-050 ...	256	
Local pissi ...	398	
Sukerhai pissi ...	350	

The germination was too uneven to give really reliable tests and most of these varieties will be tried again next year. One or two of these wheats are in good demand already, however, on account of their quality and appearance.

3—Cotton Seed Farms.

The variety recommended for Nimar district and the Seoni-Malwa and Harda tahsils of Hoshangabad district is Rosea, a hardy short stapled variety with a white flower, which has a high ginning percentage, a very white lint and a good yield.

The yields in Burhanpur tahsil were excellent and also in parts of Khandwa and Hoshangabad, and a strong demand has arisen for the seed.

Twenty-four cotton seed farms were supervised by the Department this year. The work this entails is the roguing twice of the standing plot, the separate picking and the arrangements to be made for separate ginning. This last item presents a difficult problem, as hand gins are absent and arrangements have to be made with ginning factories which cannot easily be managed. It may be possible to arrange for seed Unions on the lines of those in Berar, in the future.

List of Cotton Seed Farms in the Nimar District for the year 1913-14.

Serial No.	Name of village.	Name of owner.	Area sown.	Outturn per acre.	Ginning percentage.	Remarks.
			Acres.	Lbs.		
			Khandwa Tahsil.			
1	Bhandaria ...	Seth Ramlal ...	20	100	35	The field was badly prepared and suffered much from drought.
2	Dhaugaon ..	5 cultivators ...	25	...	...	Rejected as the owners could not arrange about proper roguing of their fields.
3	Khandwa ...	Totaram Patel ...	7	160	...	Could not be ginned.
4	Palsud ...	Rai Saheb Daji Govind Dongre.	15	240	38½	Total area was 25 acres, but whole could not be rogued.
5	Do. ...	G. K. Dongre ...	25	260	38½	
6	Rampura ..	Patel Laxman Balkrishna	150	280	39	Biggest seed farm.
7	Jaswari ...	Thakur Kishorsingh.	25	300	39½	The seed will be sown next year in the whole of his area.
8	Do. ...	Thakur Umraosingh.	4	240	38	
		Total ...	371	...	...	
		Burhanpur Tahsil.				
9	Bahadurpur ...	Bhaiman, Malguzar.	25	330	38	The crop was good and next year he will sow all his area with this cotton.
10	Loni ...	Kesho, Jairam Chandhari.	46	340	38	The whole village of Loni will be sown with Roseum cotton.
11	Shahpur ...	Shiam Rao Deshmukh.	15	240	...	Not yet ginned.
12	Do. ...	Onkar Chaudri ...	20	300	...	Do.
13	Sangrampur ...	Dhanna Appa ...	10	...	...	Rejected as there was much mixture.

Serial number.	Name of village.	Name of owner.	Area sown.	Outturn per acre.	Ginning percentage.	Remarks.
			Acres.	Lbs.		
14	Thomog (Kanapur.)	Rev. W. A. Thomas.	25	384	...	Ginned by the owner.
15	Saoli ...	Shankar Rao Ambekar.	30	386	...	Ginned by himself. The seed will be given to the surrounding cultivators for sowing.
		Total ...	171	...	...	
		Harsud Tahsil.				
16	Harsud ...	G. V. Khare ...	15	240	36	
17	Do. ...	Seth Shambhoram.	5	190	38	
18	Mahatpura ...	G. M. Reshamwala.	25	...	...	Totally damaged by hail storms in December.
19	Duggarkheri ...	Onkar Patel ...	20	...	...	Rejected as the crop was very poor and had much mixture.
		Total ...	65	...	...	
		Harda Tahsil.				
20	Dhanwara ...	Seth Harishankar..	7	400	...	Excellent crop.
		Seoni-Malwa Tahsil.				
21	Hirankheda ...	Gangaram, Kurmi .	5	320	...	Moderate.
22	Nimanpur ...	Jairam, Patel ...	5	296	...	Seed not pure.
		Hoshangabad Tahsil.				
23	Sirwar ...	Lalta Prasad ...	5	240	...	Light land.
		Total ..	15	...	...	
		Narsinghpur.				
24	Narsinghpur ...	Rajaram Dubey ...	1	400	...	Saugor jari.
			13	200	...	Rosea, suffered from drought owing to failure of last rain.

Rosea cotton has given the best results for Khandwa and the west half of the Hoshangabad district, but the early ripening types of Saugor Jari are likely to be more successful in the rest of the Division and their demonstrations will be carried out on a larger scale as seed becomes available.

4.—Wheat Seed Farms.

Seed farms were supervised by the Department during the year under report. Arrangements are made for the roguing and separate thrashing and winnowing of the crops. The surplus produce of these farms is disposed of to applicants who have registered their orders with the Department.

The chief varieties in demand are Sukerhai pissi, Bansi wheat and Dahutia wheat. All these pure wheats are fetching considerable enhanced prices in the market.

Unfortunately a great deal of damage was done to many of the seed farms by the inclement season, the crops on several of the biggest seed farms in Hoshangabad and Betul being entirely destroyed by hail.

List of main wheat seed farms in the Nerbudda Division is given below :—

List of main Wheat Seed Farms in Nerbudda Division.

Number.	Owner.	Village.	Tahsil.	Variety.	Area in acres.	Outturn per acre.	Remarks.
					Acres.	Lbs.	
1	Pundit Appaji Trimbak.	Palatwara ...	Chaurai ...	Sukerhai ...	50	...	A poor crop.
2	Munshi Raghurbir Prasad.	Deonagar ...	Narsinghpur	Do. ...	50	...	Damaged by hail.
3	Chaudhr Nazam-singh.	Hidkipipari ...	Do. ...	Do. ...	80	...	Do.
4	Wahid Khan ...	Gohochar ...	Do. ...	Bansi ...	4	...	Do.
5	Vinaik Rao ...	Midle ...	Gadarwara.	Sukerhai ...	70	400	A good crop partly damaged by rain.
6	Chaudhry Khub-chand.	Chawarpatha ...	Do. ...	Do. ...	35	450	Do.
7	Pandit Govind Rao.	Linga ...	Do. ...	Do. ...	65	...	Badly damaged.
8	Pandit Balwant Rao.	Khaparkheda ...	Sohagpur ...	Do. ...	125	490	A good crop.
9	Ganpatsingh ...	Banapura ...	Seoni-Malwa	Bansi ...	80	550	A very good crop.
10	Friends' Mission ...	Makoria ...	Seoni-Malwa	Sukerhai ...	20	...	Damaged by hail completely.
11	Kaluram Govind-ram and Harki-shan.	Hirankheda..	Do. ...	Sukerhai and Bansi.	200	...	Do.
12	Kaluram Patel ...	Misrod ...	Do. ...	Sukerhai ...	100	300	A good crop.
13	Jairam ...	Nimanpur ...	Do. ...	Do. ...	25	250	Partly damaged by hail.
14	Madho Rao ...	Undrakheri ...	Hoshang-abad.	Sukerhai Dahutia.	35 50	550 650	An excellent crop for the season.
15	Seth Hari Shankar.	Sarangpur Dhanwara Pahanpat.	Hurda ...	Sukerhai ...	16 122 85	368 184 276	60 acres being light land the crop dried owing to drought.
16	Court of Wards' Estate.	Nawapur ...	Bhainsdehi...	Bansi Sukerhai.	1 28	1,044 810	Good crop.
17	Do. ...	Dahargaon ...	Betul ...	Sukerhai	21	600	Do.
18	Govind Rao ...	Kheri ...	Do. ...	Do. ...	20	700	Do.
19	Dinanath ...	Betul ...	Do. ...	Do. ...	20	...	Destroyed by hail.
20	Reshamwala ...	Barkalia ...	Harsud ...	Bansi Hansi Pissi.	15 20	300 250	Fair crop.
21	Court of Wards' Estate.	Janthi ...	Betul ...	Bansi ...	6	762	Unirrigated.
22	Do. ...	Do. ...	Do. ...	Sukerhai ...	32	601	About ½ of the crop was irrigated.
23	Do. ...	Nawapur ...	Do. ...	Do. ...	47	658	Unirrigated.

Besides these, 30 other smaller wheat seed farms of Sukerhai pissi, Bansi, Dahutia and Tigharia varieties were supervised in Harsud, Gadarwara, Seoni-Malwa and Betul tahsils.

5.—Introduction of new Varieties.

Wheats.—Several of the selected types of wheats are in great demand. Powarkhera Bansi is a variety suited particularly for heavy soils or irrigated and manured fields and under these conditions gives large yields of up to 1,500 lbs. per acre. There were about six hundred acres grown in the neighbourhood of Seoni-Malwa where the malguzar has a large seed farm for this variety which fetches an enhanced price of Rs. 7 per Mani in the local market. The area is also increasing rapidly in Betul and in the area round the Powarkhera Farm.

Dahutia, a type selected out of Jalalia of particularly fine quality and yielding exceptionally well on Maryar land, is in great demand in the villages near Powarkhera The demand for pure seed of the Farm Sukerhai pissi is exceptionally large.

Til.—The yellow Purvi variety of Maghai *til* commonly known now as *Sarkari tilli* is firmly established in Seoni-Malwa tahsil and is in strong demand from Harda and other parts of the Hoshangabad district. The market is also firmly established and the best samples this year realized Rs. 7-8-0 per mani higher price than the Deshi variety. Central seed farms and seed depôts have been organized throughout the *til* growing areas of the district and in some ten villages last year no Deshi *til* was sown and so danger of deterioration through cross fertilization was minimized. This principle is being applied as fast as possible.

Between three and four thousand acres were sown last year. The yield is not inferior to that of Deshi *til* as the crop experiment results stated below show. On well cultivated fields the new variety yields very much better as there are a larger number of pods per plant.

Village.	Outturn per acre in lbs.	
	Deshi til.	Sarkari til.
Chandwar	...	260
Satwansa	160	250
Bhaironpur	270	300

Groundnuts.—The area under this crop is spreading gradually in parts of Khandwa tahsil, in the Babai tract of Hoshangabad and just round Narsinghpur. The small Japanese variety is being mostly introduced.

6.—AGRICULTURAL SHOWS.

The Divisional Agricultural Conference was held at Powarkhera Farm on February 16th and 17th and was largely attended. A new feature was the institution of a competition for the improved varieties of cotton, wheat, gram and til that the Department is trying to introduce into the Division. An excellent set of exhibits was sent in and competition was very keen.

The Conference discussed three subjects in committees—

(1) Agricultural co-operation.

(2) Agricultural education with special reference to the recruitment of the Agricultural Department.

(3) The best means of demonstrating new machines and implements.

The trials of sugarcane mills and new ploughs and other machinery on view were followed with the greatest interest by the visitors.

Medals and sanads were distributed by the Commissioner (Colonel Horsbrugh) who presided at the second afternoon's proceedings :—

Medals.

1. Thakur Kishor Singh of Jaswari, Nimar.
2. Munshi Manoharlal of Dhanwara, Harda.
3. Pundit Balwant Rao Bhide of Khaperkhera, Sohagpur

Sanads.

1. Kesho Jairam Chaudhari of Loni, Nimar.
2. Lakshman Balkrishna Bedekar of Rampura, Nimar.
3. Govind Kesheo Dongre of Palsud, Nimar.
4. Lakhuji Patel, of Rondha, Betul.
5. Appaji Trimbak, of Chauraiy Chhindwara.

District shows were also attended as follows :—

Singaji	...	Nimar district	...	Cattle show.
Burhanpur	...	Do.	...	Agricultural and Industrial.
Burman	...	Narsinghpur district	...	Agricultural show.
Chhindwara	...	Chhindwara district	...	do.

The shows at Chhindwara and Burhanpur are newly instituted. It is proposed to make the former an annual affair. The Burhanpur show was excellently arranged and the prime mover (Mr. Meharali, Extra-Assistant Commissioner) is to be congratulated on its success.

Both Singaji and Burman were attended by numerous crowds and these shows are yearly improving in interest.

7.—Co-operative and Agricultural Associations.

The old Betul District Agricultural Association has been changed into an Agricultural Union and the members are all Directors or Shareholders of the Central Bank and so directly interested in the Co-operative movement.

The Union had a farm of 300 acres on a one year's lease last year in which much interest was taken by members and which has been mentioned in another part of this report.

Owing partly to the difficulty in obtaining a suitable lease and also difficulties of efficient management it has been decided to substitute for it a Government seed farm which will supply seed to private seed farms owned by members of the Agricultural Union, who will in their turn provide seed for the various Co-operative Societies.

Eighteen members had secondary seed farms in the year under report, of which two failed to keep their seed pure and were rejected, and in four others the crops were ruined by hail and drought. The surplus seed from the other farms will be utilized to provide pure seed to 11 or 12 societies who will keep their seed in co-operative seed pits. In addition to registering orders for seeds the Central Bank has also opened an implement depôt. Thirty-two machines and implements, valued at Rs. 8,115, were purchased through this implement depôt. These include two oil-engines and pumps for well irrigation and one Nerbudda Reaper which was purchased by a Co-operative Society, this being the first instance of a case of this sort in the Province.

The excellent start made by this Union is largely due to the skill and enthusiasm of Mr. P. Hemingway, the Deputy Commissioner.

A similar agency on a very much smaller scale has been started for the supply of seeds and implements at the Sohagpur Central Bank, Piparia, and holds out prospects of success in the near future.

The principle of splitting the District Agricultural Associations into Sub-Associations has been still further carried out, and, where co-operation has not yet made much headway, they are the best means available of getting in touch with the smaller malguzars and tenants, and in fact pave the way for co-operation to some extent.

The following Sub-committees are now organized and meet regularly :—

Burhanpur	...	Nimar District.
Khandwa	...	
Harsud	...	
Seoni-Malwa	...	Hoshangabad District.
Powarkhera	...	
Babai	...	
Chhota Chhindwara	...	Narsinghpur District.
Burman	...	
Chaurai	...	Chhindwara District.

The Seoni-Malwa Committee continues to do excellent work in the introduction of Purvi Maghai til, new wheats and cotton sowing in lines. Of the newly started committees, the Chaurai one in particular is making rapid progress under the enthusiastic management of Pundit Appaji Trimbak.

8.—Destruction of Wild Animals.

The pig-hunting committees in Seoni-Malwa tahsil have now accounted for 9,000 pigs since they commenced operations three years ago and 18,000 have been killed in the neighbouring tahsil of Harda.

As a result pigs are scarce in the more open cultivated villages but are still killed in large numbers in the villages adjoining jungle Subscribers from the open villages in a pig-hunting circle are objecting very strongly to paying rewards for pigs killed in jungly villages two or three miles away and quite forgetting that if the pigs were not kept down in the jungly tracts they would speedily increase in numbers and overrun the open tracts as they did three years ago. As a matter of fact, I am personally of opinion that at present we are simply keeping the pig out of the open villages to some extent; but owing to the enormous extent of Government and Malguzari jungle bordering on the open cultivated tracts it will be impossible to effect any permanent improvement until the pigs in these jungles are thinned out very considerably by systematic drives.

9.—Mention of Staff.

Mr. Nandkishor has continued to do excellent work, and his intimate knowledge of the country and tact in dealing with the people have proved very valuable.

Madhoprasad carried out his duties in Nimar successfully and got on extremely well, both with the District officials and non-officials.

As usual the District staffs have shown the greatest sympathy with the work of the Department and always gave what help they could. Mr. Mehar Ali at Burhanpur and Messrs. Aduram Chaudhari at Chaurai and Chandorkar at Harda deserve mention, while I personally desire to thank Messrs. Joshi, Extra-Assistant Commissioner, and Gokulprasad, Tahsildar, of Hoshangabad, for the hard work and enthusiasm they showed in order to make the Powarkhera Show a success.

Report on Agricultural Demonstration in Jubbulpore Division for the year 1913-14.

1.—INTRODUCTORY.

This report deals with the various branches of agricultural work apart from that of the Experimental Farm, Adhartal, which has been published separately.

2.—DEMONSTRATIONS UNDER GOVERNMENT IRRIGATION TANKS.

(*a*) *Mahgwan Farm.*—This plot, consisting of 6·67 acres, is situated about two miles from Deori Railway Station in the commanded area of the Barera Kalan tank. The soil is *schra* and is suitable for the growth of paddy and sugarcane.

The Farm was managed by a Kamdar on Rs. 9 and in addition he had charge of demonstration work in the villages situated in the commanded area.

The season was very unfavourable as the monsoon failed completely at the end of August, and owing to the absence of heavy storms the tank also did not fill and was only able to give a very limited amount of irrigation.

(1) The first series of plots was designed to demonstrate the method of single seedling transplantation against the local *machaua* method. The demonstrations were carried out with three different kinds of early ripening paddies and each plot received two irrigations (which was all that was available) which, however, were not sufficient to give full yields on this poor class of soil last season.

Variety.	Yield per acre.		Difference in favour of transplanted.
	Transplanted.	Machaua.	
	lbs.	lbs.	
Basmatia	544	152	392
Early Nasik	560	...	560
Dilpasand	320	...	320

Rice sown by the local *machaua* method gave practically no yield on these light soils last year even with two irrigations

(2) Another series of plots was designed to demonstrate the use of manures. The same three varieties were used and all the plots were transplanted and received two irrigations.

Variety.	Outturn per acre in lbs.			
	No manure.	Farm yard manure 12 cart-loads.	Green soiled with *san.*	Bone dust 8 mds.
Basmatia ...	544	576	544	593
Early Nasik ...	560	624	560	816
Dilpasand ...	320	448	352	544

Bone dust gave promising results, but the season was entirely unfavourable for ascertaining the true value of the different manures.

Two new medium variety paddies—Makruja and Eklombi—were tried, but totally failed owing to the bad season and failure of the tank; and round chillies and turmeric gave disappointing results for the same reason. Yellow *mung* gave a fair crop.

Demonstrations in the commanded area.—About 100 acres of rice were transplanted in eight villages in the commanded area, sites being chosen as close to the channel as possible and the work being supervised by the *kamdar*. It was not possible to give two irrigations to all these fields, but so far as could be done, preference was shown to those cultivators who transplanted. In spite of the bad season many fields yielded at over 1,200 lbs. per acre, the actual best being 1,280 lbs.; and, if irrigation can only be guaranteed, there is every chance that this method will be quickly established as a regular custom.

The Khari variety of thin cane is becoming very popular, and its spread is only a matter depending on the available supply of seed cane. A few canes were given to a selected Kachhi two years ago, and he sold all his available supply of seed canes this year at the rate of Re. 1 per 100 which is four times the price of local Barhai. This variety as grown here needs only three or four irrigations. No attempt is being made to introduce thick canes as the water-supply is not sufficient.

Demonstration of implements.—Small Nahan cane mills have now completely ousted the local *kolhu* and as one cultivator naively remarked to me the other day 'The name of *kolhu*' has now been forgotten. Between sixty and seventy are now in regular use, and ordinary repairs and renewals are carried out by the help of the Kamdar who has a small stock of the necessary articles. Meston ploughs are also in great demand.

The number of implements sold is given below in Statement I.

Statement II shows the seeds supplied. The whole of the surplus stock of the three early paddies demonstrated was sold before harvesting was finished and large further orders have been registered for the same.

STATEMENT I.

Name of implement.	No. sold.
Meston ploughs	61
Monsoon ploughs	1
Spare shares of Meston ploughs	1
Nahan Wakil mill	14
Fastening bolts and nuts of the mill	1
Total ...	78

STATEMENT II.

Kind of seed supplied.	Quantity supplied.	No. of orders.
	lbs.	
Basmatia paddy	917	18
Nasik early	90	3
Dilpasand paddy	463	8
Kadamphul paddy	313	2
Haradgundi paddy	58	1
Total ...	1,841	32

The following table shows the estimated cost of grain produce on the Mahgwan Farm during the year under report :—

Kind of grain.	Quantity in lbs.	Rate per rupee.	Estimated value.
	lbs.	lbs.	Rs. a. p.
Basmatia paddy ...	626	20	31 4 9
Nasik early paddy ...	640	20	32 0 0
Dilpasand paddy ...	416	18	23 1 9
Kadamphani paddy ...	208	20	10 6 4
Turmeric ...	508	10	50 0 0
Chillies ...	40	6	6 10 8
Mung, yellow ...	86	20½	4 4 9
		Total ...	157 12 3

Statement showing the receipts and expenditure on the Mahgwan Farm during the year under report.

Heads.	Amount.	Total.
	Rs. a. p.	Rs. a. p.
Receipts.		
Cost of seeds of kharif crops produced on the Farm ...	136 9 11	...
Cost of rice straw produced on the Farm ...	24 0 0	160 9 11
Expenditure.		
Contingencies other than seeds and implements ...	175 10 6	...
Cost of seeds purchased	36 1 7	...
Cost of implements	13 5 0	...
Pay of *kamdar*	99 0 0	324 1 1

(*b*) *Jarwahi Demonstration Farm.*—This Farm is situated in the village of Jarwahi, two miles from Niwar Railway Station, and in the area commanded by Piprodh tank and was started last year.

It consists of 10·84 acres of *sehra* and *domatta* soil, and the land was leased rent-free by the proprietor, Mr. Shiam Sunder Bhargava, son of R. B. Biharilal Khazanchi, who is taking the greatest interest in its progress.

The season was if anything worse than at Mahgwan and even transplantation had to be done with the help of irrigation water. This tank held out better than Barera Kalan, however, and in most cases two and occasionally three irrigations could be given to the transplanted plots.

Demonstrations were carried out both on the Farm proper and in the neighbouring fields of the tenants and malguzars.

Series I.—To demonstrate the benefits of transplantation over the local *machaua* method:—

System.	Seed rate per acre.	Outturn per acre.	
		Grain.	Straw.
	lbs	lbs.	lbs.
Machaua	100	111	1,259
Transplanted	30	640	1,610

The soil was *sehra* and both plots received two irrigations. Yields of up to 3,500 lbs. per acre were obtained from the demonstration plots of transplanted rice belonging to cultivators.

Series II.—To demonstrate different methods of manuring. The variety was Dilbaksha, a medium variety, and all plots were transplanted :—

Manure.	Yield per acre.	
	Grain.	Straw.
	lbs.	lbs.
No manure	640	1,610
Mahua refuse	738	1,159
Green-soiled with *san*	889	1,784

The *san* was ploughed under when 2' high. *Mahua* refuse is locally available at the Katni Distillery, and the villagers are now carting this material to manure their paddy and cane fields.

Groundnuts were demonstrated for the first time and yielded as follows:—

Variety.	Yield per acre.
	lbs.
Raipur Local	1,120
Small Japanese	883

A brisk demand for seed has arisen locally.

A number of selected types of paddy were tried. Transplantation was resorted to in every case —

Variety.	Yield per acre.
	lbs.
Basmatia	856
Nasik early	706
Maknuja	1,184
Eklombi	1,541
Dilbaksha	640

The highest yield obtained in a cultivator's plot was from a very good field in the *geonra* situation. The plot was transplanted by the assistance of the Kamdar, and an outturn of 3,428 lbs. per acre was obtained. The variety was a medium late ripening one known as Tilsan.

In the *rabi* season demonstrations were practically confined to different kinds of selected wheat sown as a single crop and as a double crop after dhan. The results are given below.

Statement showing the outturn of Rabi crops of Jarwahi Farm for the year 1913-14. *Soil—Domatta.*

SINGLE CROPS.

Name of crop.	Outturn per acre.	Remarks.
	lbs.	
Bansi wheat	773	The crop was splendid.
Hansi pissi	550	Germination and growth was uniform.
Sukerhai pissi	294	Germination was defective and resowing had to be done.
Gram local	250	Was sown as a demarcation line between two wheat varieties.
Red linseed	200	Do. do.
Barley	800	Was sown in low-lying corner.

DOUBLE CROPPED AREA.

Name of crop.	Outturn per acre.	Remarks.
	lbs.	
Muriya wheat	209	The soil was poor and the sowing was rather late. Gram was mixed which gave 60 lbs. outturn in addition.
Linseed red, sown utera	237½	The crop was encouraging.
Hansi pissi	400	The growth was satisfactory and appears to suit Sehra better than other wheats.
Sukerhai pissi	500	This was sown in paddy nursery plots and therefore it took advantage of manure added to it.
Oats	180	The crop was poor owing to want of sufficient moisture.

The results seem to show that Bansi is a very big yielder on irrigated black soils, especially with manure. Hansi pissi is a nice mellow grained wheat and does particularly well on light soils. Linseed did well as an *utera* crop.

A small implement depôt has been opened in charge of the *kamdar*, and the accompanying statements show the sales of both seeds and implements effected.

Statement showing the sale of implements from the Jarwahi implement sub-depôt during 1913-14

Name of implements.	No. sold.	Cost.	No. of orders.
		Rs. a. p.	
Meston ploughs	10	47 8 0	5
Dredgers	1	12 9 7	1
Nahan Wakil mill	1	62 11 6	1
Total ...	12	122 13 1	7

List showing the distribution of pure seed from the Jarwahi Farm during the year 1913-14.

Kind of seed.	Quantity supplied.	No. of orders.	Remarks.
	lbs.		
Nasik early paddy ...	206	3	Large quantities of seed of these varieties have been ordered and will be supplied as far as possible from the Experimental Farm, Adhartal.
Eklombi paddy ...	433	9	
Basmatia paddy ...	612	11	
Maknuja paddy ...	144	1	
Dilbaksha paddy ...	110	3	
Small Japanese groundnut ...	440	14	
Wheat, Bansi ...	400	1	
Pissi Sukerhai ...	100	1	
Tur, Unao ...	17	1	
Maize, Jaunpur ...	12	1	
Hardgundi paddy ...	72	1	

Statement showing the receipts and expenditure on the Jarwahi Demonstration Farm during the year 1913-14.

Heads.	Amount.	Total.
Receipts.	Rs. a. p.	Rs. a. p.
Cost of *kharif* grains produced on the Farm	262 5 9	...
Cost of rice straw	30 0 0	...
Cost of *rabi* grains produced on the Farm	179 14 7	...
Cost of *bhusa* of the Farm	26 10 8	498 15 0
Expenditure.		
Contingencies other than seeds and implements	253 1 0	..
Cost of seeds purchased	74 12 3	...
Depreciation on implements (worth Rs. 54-6-6) purchased for Farm use @ 25 per cent.	13 9 6	...
Same on animals purchased for Rs. 153 @ 10 per cent	15 5 0	...
Pay of *kamdar*	132 0 0	498 11 9

The *kamdar* in charge, Shyamley, has done good work, but the success of this Demonstration Farm is largely due to the keen interest taken in it by the malguzar, Mr. Shyam Sundar Bhargava.

(*c*) The Experimental Farm at Adhartal is commanded by the Jubbulpore tank. Since the opening of this Farm great progress has been made and considerable areas of what was two years ago fallow land, has now been broken up and placed under potatoes, sugarcane and other garden crops, while the cultivation of groundnuts and transplantation of paddy are rapidly spreading. Numerous applications are made at the Farm office for advice, selected seed or improved implements.

(*d*) The Khitola Tar, which, with the exception of Rumal, is the only other *safe* project in the Division, will be tackled this year and transplantation of rice and cultivation of groundnuts demonstrated.

3.—Other Demonstration Farms.

(*a*) *Seoni Chhapara.*—These demonstrations were carried out in the village of Khairi. Land and labour being provided by the malguzar Rai Bahadur Vishwanath Singh, who in return took the proceeds. Three varieties of early ripening cotton were tested, but owing to late sowing and excessive rain in the early part of the monsoon followed by prolonged drought, results were negative, and a further trial will have to be made next year.

A number of wheat varieties were tested on measured plots. The soil was Morand II of moderate quality. The results are given below, but the season was a poor one for the wheat crop :—

Variety of wheat.	Area of plot in acres.	Yield per acre.	Remarks.
		lbs.	
Pusa 4	2·50	276	Unsuited to the tract.
Sukerhai pissi	8·00	271	A poor plot.
Bansi	2·50	164	Soil too light for the variety.
Hansi pissi	1·00	323	Require further trial next year.
A049	2·25	335	
A050	3·90	349	
A012	3·40	239	Disappointing.
Haura	2·75	354	Promising.
Tigharia	3·00	408	

Last year Tigharia gave the best crop.

A proper Demonstration Farm of 25 acres has now been opened, and new varieties of wheat, gram and cotton are to be tested.

In addition the Agricultural Assistant, Seoni, supervised a seed farm of about 50 acres of Tintaria, a selected type of early ripening cotton at Bakhari, the residence of Pandit Jiwanlal, and supervised various wheat seed farms and small demonstrations.

A small implement depôt has just been started and 21 implements were sold for Rs. 674-6-3.

(*b*) *Demonstrations in the Kanthar.*—The Agricultural Assistant, Patan, with two *kamdars*, supervised the demonstration plots in the Kanthar tract of Patan Tahsil. The object has been to demonstrate the better cultivation of *kharif* crops by sowing them in lines.

These villages are partly *rabi* and partly *kharif*, and unless the latter class of cultivation is at least 50 per cent, it is almost impossible to get the villagers to attempt to improve their *kharif*, as, owing to scarcity of labour and bullocks, the rabi land is nearly always dealt with during breaks in the rains to the neglect of the *kharif*. For this reason, demonstration work will in future be concentrated towards the Belkhera side, as the proportion of *kharif* to *rabi* is there much greater.

Statement showing results of Kharif demonstration plots.

Village.	Malguzar.	Crop.	Area sown.	Outturn per acres.
1	2	3	4	5
			Acres.	lbs.
Karhaiya ...	Thakur Arjunsingh Fouzdar ...	Cotton ...	20	200
		Juar ...	25	328
Kuakhera ...	Pandit Ramprasad of Maili ...	Cotton ...	10	160
		Juar ...	10	200
Natwara ...	D. B. Ballabh Das ...	Cotton ...	10	287
		Juar ...	10	250
Rewanza ...	Manrakhan ...	Cotton ...	10	275
Sawanpura ...	Thakur Sobhasingh ...	Do. ...	6	190
Singori ...	Thakur Himmatsingh ...	Do. ...	5	160
Burbutti ...	R. B. B. L. Khazanchi ...	Groundnut ...	5	640
Bhita ...	D. B. Ballabh Das ...	Do. ...	5	800
Mahuakhera ...	Latorelal, Bania ...	Do. ...	2	800
Chapod ...	Pandit Laxman Rao ...	Do. ...	1	1,200

In every case where early sowing was done good crops were obtained, and this appears to be one of the most important points in successful kharif cultivation in these parts. Sowing in the dry for cotton will be advocated next year when the land is free of weeds.

(*c*) Several of the more enlightened malguzars have started small Demonstration Farms for their own estates. The men in charge of these estates have as a rule been trained on the Government Farms. R. B. B. D. Shukul's Demonstration Farm at Mansakra, near Sihora, is a case in point, in which new varieties of wheat, dhan, groundnuts, etc., are being tested and the seed propagated for further demonstrations in his villages. Mr. S. S. Bhargava and D. B. Seth Ballabh Das in Jubbulpore, and Pandit Hardayal and Indralal Ojha in Mandla districts and others are also starting this excellent practice.

These plots are of course visited at regular intervals by the Agricultural Assistants and their assistance is invariably given when asked for.

4.—Malguzari Cattle Breeding Farms.

The increasing price and scarcity of plough-cattle is becoming a serious matter, and an attempt is being made to resuscitate cattle breeding in parts of this Division. Conditions in many parts appear to be favourable as jungle with grazing of a sort is available in many places.

The value of pedigree is not fully understood yet, however, and for the present an attempt is being made to demonstrate that a good class of plough-bullocks can be raised more cheaply than by purchase from Native States, by using a pedigree bull and the best of the local cows and by supplementing the grazing with reasonable stall feeding during the hot weather months.

Several influential malguzars of Jubbulpore and Seoni Districts recognizing the importance of the work have opened Farms on the lines I have laid down. The individuals of the herd are all named, and a simple register in the vernacular is kept by the Havaldar in charge, while these farms are closely supervised by the Agricultural and Veterinary Assistants, who have orders to help in every way.

The great difficulty has always been to get a sufficiently good stamp of cow and sufficient numbers to start the herd, but pedigree bulls are in most cases provided from the Government Cattle Breeding Farms.

Six such private Cattle Breeding Farms have so far been started and are supervised by the Department:—

Owner's name.	Village.	Tahsil.	Herd.				Remarks.
			Bulls.	Cows.	Calves.	Total.	
Mr. Shyam Sunder Bhargava..	Kanjania ...	Jubbulpore..	1	21	13	35	The animals of this herd originally came from south-west of Punjab and are of very fine stamp with some Malvi blood.
R. B. B. D. Shukul ...	Mansakra ...	Sihora ...	1	18	5	24	Half the cows are of local and half of Sanka breed.
Pandit Jamunaprasad Khamparia.	Deori ...	Do. ...	1	11	9	21	Local cows. The bull is from the Powarkhera Government Breeding Farm.
Seth Kashiprasad Sharaf ...	Jubbulpore...	Jubbulpore...	1	27	21	49	Local cows. Powarkhera bull.
R. B. Dadu Vishwanath Singh.	Dalal* ...	Seoni ...	1	20	...	21	Gaolao breed. One bull and 10 cows from Telankheri.
Court of Wards, Seoni ...	Gangai* ...	Do. ...	1	20	...	21	Local cows. Bull from Powarkhera Government herd of Malvi cattle.

* These two farms have only been started a few months ago.

5.—Wheat Seed Farms.

Some 60 wheat seed Farms were supervised by the staff of the Department in this Division during the year under report, most of them being situated in the Jubbulpore Haveli. The cutting and threshing are supervised by the Agricultural Assistants in charge of the Circle and the selected varieties thus kept pure. The season was disastrous for the wheat crop, particularly in Jubbulpore, the drought in October and November killing out much of the young wheat and hail in February and March doing further damage, while the tale of disaster was completed by the succession of heavy storms in March and April which did immense damage to the wheat and gram on the threshing-floors. As a result only half a dozen seed farms have any surplus stock of seed to dispose of to the Department, and large indents have been made on the seed farms in the Nerbudda Division where the crop on the whole was better.

The accompanying statement shows the seed farms supervised by the Department.

(*a*) Seed farms under Agricultural Assistant, Patan.

Name of village.	Name of owner.	Area sown.		Total.	Remarks.
		Sukerhai pissi.	Bansi.		
1	2	3	4	5	6
		Acres.	Acres.	Acres.	
Patan ...	Parsadirao ..	8	...	8	Poor crop, 200 lbs. per acre.
Rewanza ...	Manrakhan ...	30	...	30	Good sample, but poor crop, 333 lbs. per acre.
Singora ...	Himmatsingh ..	8	...	8	Good sample, poor crop, 250 lbs. per acre.
Barhaiyakhera ...	Rikhiram ...	8	...	8	Spoilt by hail and rain, 200 lbs. per acre only.
Chapod ...	Lakshman Rao ...	8	...	8	Sample good, poor crop, 280 lbs. per acre.
Belkheri ...	Nandlal Rao ...	30	8	38	Sample pure, fair crop, 400 lbs. per acre.
Pathrora ...	Sheoprasad Guru...	45	...	45	Good sample, 266 lbs. per acre.
Debi Suraiya ...	Thakur Arjunsingh Fouzdar.	100	10	110	Fair crop.
Sahsan ...	Do. ...	60	...	60	Sample is very good.
Udna ...	Do. ...	20	...	20	Grain is thin and discoloured, 360 lbs. per acre.
Chandwa ...	Ramprasad ...	12	...	12	Sample good.
Kanvas ...	Court of Wards ...	65	...	65	Badly damaged by rain on the threshing-floor.
Sahoda ...	D. B. Ballabh Das...	50	...	50	Moderate crop.
Hada ...	Seth Kashiprasad Sharaf. ...	60	20	80	Seed sample good.
Barkhera ...	Pandit Raghunath Rao.	40	...	40	
Mohas ...	R. B. Bansilal Abirchand.	8	8	16	
Boria ...	Nandlal Rao ...	10	...	10	
Kajjarwada ...	Beohar Raghubirsingh.	40	...	40	An excellent crop.

Statement showing the number of Wheat Seed Farms, with the names of their owners and area under each variety of wheat, managed by the Agricultural Assistant, Sihora, during the year 1913-14.

Serial No.	Name of Seed Farms.	Name of owner.	Variety.												Total area in acres.	Remarks.
			Sukerhai.		Bansi.		Hansi.		Muria.		P.-4.		Sardar × Zuff.			
			Area sown.	Out-turn.	Area sown.	Out-turn.	Area sown.	Out-turn.	Area sown.	Out-turn.	Area sown.	Out-turn.	Area sown.	Out-turn.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			Acres.	lbs.	Acres.	lbs.	Acres.	lbs.	Acres.	lbs.	Acres.	lbs.	Acres.	lbs.	Acres.	
1	Pabrewa ...	R. B. B. D. Shukal, Sihora.	125	78,000	...	...	...	...	...	...	...	...	·60	240	125·60	Crop was very good, Sukerhai yielded at 900 lbs. per acre.
2	Ponda ...	Do. do. ...	...	...	...	...	10·0	6,000	97·0	40,000	...	...	...	...	107·00	The crop was good, but grain much damaged on threshing-flour.
3	Mohania ...	Do. do. ...	21·0	8,000	...	...	...	...	...	...	...	...	...	..	21·0	Fairly good. but grain much damaged on threshing-flour.
4	Khamaria ...	Do. do. ...	17·80	8,000	..	...	...	...	...	...	...	...	...	...	17·80	Do. do.
5	Barkhera ...	Do. do. ..	...	...	70·0	56,000	...	...	...	...	...	..	...	...	70·0	Excellent, one field gave 1,100 lbs. per acre, the other 860 lbs. per acre.
6	Mansakra ...	Do. do. ...	...	...	15·0	8,000	...	...	8·0	3,200	...	...	...	...	23·0	Fairly good.
7	Simaria ...	Pandit Kesheo Rao Phansey, Sihora.	30·0	...	20·0	...	...	...	...	...	...	...	...	...	50·0	Failed owing to abnormal season.
8	Baragwan ...	R. S. Gurdin Misra, Sihora.	130·0	78,000	35·0	14,000	4·0	1,600	...	...	2·0	600	...	...	171·0	Bad crop, wheat much damaged by heat in October and November.

Statement showing the number of Wheat Seed Farms, with the names of their owners and Area under each variety of wheat, managed by the Agricultural Assistant, Sihora, during the year 1913-14.—(Concld.)

Serial No.	Name of Seed Farms.	Name of owner.	Variety.												Total area in acres.	Remarks.
			Sukerhai.		Bansi.		Hansi.		Muria.		P.-4.		Sardar × Zuff.			
			Area sown.	Out-turn.	Area sown.	Out-turn.	Area sown.	Out-turn.	Area sown.	Out-turn.	Area sown.	Out-turn.	Area sown.	Out-turn.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			Acres.	lbs.	Acres.	lbs.	Acres.	lbs.	Acres.	lbs.	Acres.	lbs.	Acres.	lbs.	Acres.	
9	Sichuli ...	Pandit Jamna Prasad, Khamparia, Sihora.	400·0	180,000	...	...	...	...	...	...	...	...	...	...	400·0	The crops were fair, but were badly damaged by rain and hail in March.
10	Deori ..															
11	Selwara ..															
12	Khitola ..	Do. do. ...	...	...	12·0	...	...	...	...	...	...	...	...	...	12·0	
13	Bhatadon ..	Pandit Badri Prasad Padrha, Sihora.	40·0	16,000	...	...	...	...	...	...	...	...	...	...	40·0	Moderate, only damaged by rain.
14	Ramkhiria ...	Seth Tara Chand, Sihora ...	..	...	25·0	...	8·0	4,800	...	...	...	...	...	...	33·0	Moderate, only due to abnormal season.
15	Persel and Dhimarkhera...	S. S. Bhargao ..	...	...	25·0	12,000	...	...	...	...	...	...	...	...	25·0	The crop was good, but was damaged by rain on threshing-floor.
16	Tighara ..	Do. ...	...	...	15·0	8,000	...	...	...	...	...	...	...	...	15·0	
17	Manegaon ...	Do. ...	...	...	25·0	12,000	...	...	...	...	...	...	...	...	25·0	Fair crop, but damaged by high winds and rain.
18	Ghana ...															
19	Singodh ...	R. S. Gurdin Misra, Sihora.	55·0	33,000	30·0	12,000	...	...	25·0	8,000	..	...	...	...	110·0	Fair crop.
20	Kaladoomer ..	D. B. Pallabh Das, Jubbulpore.	40·0	2,000	...	...	...	...	...	...	...	...	...	...	40·0	Very fair.
21	Kajarwara ..	Beohar Raghubir Singh, Jubbulpore.	60·0	42,000	...	...	...	...	...	...	...	...	...	...	60·0	Excellent.
22	Dhora ...	Pandit Suraj Prasad Shukal	30·0	15,000	6·0	2,400	4·00	600	...	...	...	...	...	...	40·0	Good, except Bansi which was poor.

(*c*) Seed Farms under the Agricultural Assistant, Seoni.

Name of owner.	village.	District.	Name of crop.	Area sown.	Outturn.	Remarks.
				Acres.	lbs.	
R. B. Dadu Vishwanath Singh.	Khairi ...	Seoni ...	Sukerhai Pissi.	34·20	7,560	221 lbs. per acre.
Thakur Makhan Singh.	Mungwani...	Do.	do.	150	29,680	198 lbs. per acre.
Do. ...	Seoni Bakoda.	Do.	do.	35	...	Totally failed, winnowing not done.
Do. ...	Partabgarh...	Do.	do.	50	...	...
Dadu Khushiram ...	Datni. ...	Do.	do.	218	18,634	85 lbs. per acre. The soil had become too hard at the time of sowing. Germination was uneven. Sowing was late.
Court of Wards ...	Seoni ...	Do.	do.	151·11	40,426	Best sample, 267 lbs. per acre.
Pandit Appaji Trimbak.	Chaurai ...	Chhindwara.	do.	33	11,480	348 lbs. per acre. Seed somewhat spoilt by rain on threshing-floor.
Pandit Hardayal ...	Binaika ...	Mandla ...	do.	45	17,220	383 lbs. per acre.
Pandit Sheoprasad.	Hirdenagar..	Do.	do.	3	...	The threshing-floor was set on fire.

6.—Agricultural Shows.

The Divisional Agricultural Conference was not held this year owing to the prevailing scarcity. Local fairs were attended at the following places, however, and agricultural shows and demonstrations held : —

Mundara Fair	..	Seoni District.
Hirdenagar Fair	...	Mandla District.
Garhakota Fair	...	Saugor District.

The Mundara Fair was not so largely attended as usual, but the exhibits were good. The Hirdenagar Fair was entirely ruined by rain. The show at Garhakota is jointly subscribed for by the Damoh and Saugor District Councils. The cattle and horse classes were well filled, showing an improvement on last year, while the exhibits of grain and other agricultural produce were first rate.

7.—Agricultural Co-operation and Agricultural Associations.

In some ways progress has been retarded in Sihora by the extremely bad season. In the Bargwan Union practically none of the pure seed obtained last year could be sown, as the soil is *kabar*, which had dried too hard and could not be sown in November. The Saroli Union was doing well and had very promising crops of pure Bansi and Sukerhai Pissi, but the standing crops were completely destroyed by a tremendous hail storm in March.

These two Unions, which are composed of ten and seven societies, respectively, are therefore being supplied with an entirely fresh supply of selected wheat by the Department. They are being financed by the Central Bank, and each Union has arranged for co-operative *bandas* (seed pits) for the joint storage of grain. Grain is to be paid back at *siwai* rates into the pit every year and the siwai profits go partly to paying off the capital borrowed from the Central Bank, partly into a reserve fund and partly to pay for the salary of a trained man who will look after their seed supply, arrange for marketing and for the demonstration and repair of improved ploughs, etc.

A Seed Supply Association is attached to the Central Bank and has been given a room in the new building. This office is provided with samples of selected grains, new implements and bulletins of Agricultural interest, etc., and is in charge of a trained Supervisor who is a servant of the Bank.

Orders for selected kinds of pure seeds and improved implements are registered by members of Co-operative Societies at this office, and the supply is arranged for by the Agricultural Supervisor in charge, who, at slack times of the year, is employed on demonstration duty among the different village Societies.

The Seed Supply office supplied the following quantities of seed from 1st April 1913 to 31st March 1914 inclusive:—

Seed.	Quantity in maunds.	Approximate value in rupees.
		Rs.
Sukerhai Pissi ...	73¹	2,924
Bansi wheat ...	176	704
Other selected wheats ...	34	136
Selected varieties of *dhan* ...	21	75
Other seeds ...	2½	12
	964½	3,851

Very much larger orders are being registered for the next year. The implement depôt attached to the Seed Supply Association sold 42 implements (mostly iron ploughs) for Rs. 406.

An arrangement has been made with Messrs. Octavius Steel and Company whereby this Bank and the Jubbulpore Central Bank are to act as agents and stock considerable numbers of Monsoon and Meston ploughs which are in good demand, together with spares, for sale to members of co-operative societies.

In every district where co-operation has been started it is now the custom to hold meetings of the Co-operative Central Banks and of the Agricultural Associations together, as these two organizations have in some respects much the same object in view, *viz.*, the improvement of Indian agriculture and financing the ryot which is the first step towards affecting the improvement.

Where co-operation does not yet exist, the policy has been to split up the District Agricultural Association into Sub-Committees, each dealing with a homogeneous area of small size. By such means it has been found by practice easier to get in touch with the smaller malguzars and tenants.

The Patan Sub-Committee was formed three years ago, and all its members are doing some work either in the direction of *kharif* cultivation improvement or seed farms. The President is Thakur Arjunsingh Fouzdar who has done a great deal to make it a success.

Other smaller Committees which have recently been formed are at Binaika and Hirdenagar in Mandla and Barghat in Seoni Districts.

8—Court of Wards.

The Dewan's Court of Wards Estate continues to do excellent work. The whole of the irrigable portion of the home-farm rice area was transplanted with single seedlings last year and good crops considering the unfavourable season were obtained. The *sir* Overseer and one of the Hawaldars attended a short course of instruction on the Adhartal Farm. Assistance has been asked for and is being given as far as possible to the Jubbulpore and Mandla Court of Wards Estates.

9.—Demonstrations of Implements.

The Monsoon plough has suddenly come into great favour, and several hundred ploughs are now at work in the Jubbulpore District alone.

This plough is a recent introduction and demonstrations have only just been commenced, so that its popularity is very encouraging. In this connection it is worthy to note the help given by the malguzars of the district.

This plough was first demonstrated in Singodh village, where the malguzar first learning its use, succeeded in clearing 83 acres of very heavy *kans* by using buffaloes. As a result of his efforts large number of ploughs are now working in this particular tract which is very badly *kans* ridden, and his example was at once followed by Mr. Shyam Sundar Bhargawa, D. B. Ballabbhdas and other big landlords.

Owing to the sudden demand, the supply of these ploughs in Northern India became exhausted, and arrangements are now being made with the makers and agents to ensure that no such shortage shall occur in future.

The M. S. N. is a plough which is very popular in *sehar* land about 200 having been sold, and arrangements are being made to demonstrate it widely this year.

Sugar cane mills, dredgers, etc., etc., are also in increased demand.

10.—Staff.

Excellent work has been accomplished by Lakshmi Narain Dube and G. V. Bapat, Agricultural Assistants, in Sehora and Patan. T. K. Ghatpande was transferred as Agricultural Assistant to Seoni in November and by his tact and keenness has already effected great improvement in these parts.

I again wish to acknowledge gratefully the assistance I have received from District Officers in this Division. Khan Sahib Wali Mohammad and Mr. Chhatar Singh in particular have been of the greatest help in Seoni District and many others I could mention have invariably done their best to help the Department.

APPENDIX.

GLOSSARY.

Botanical, English and Vernacular names of Crops, etc.

Botanical.	English.	Vernacular.
Cereals.		
Triticum sativum ...	Wheat ...	Gehu, gahu.
Andropogon Sorghum var, vulgare ...	Great millet ...	Juar (jowar).
Oryza sativa ...	Rice ...	Dhan.
Zea mais	Maize ...	Makka, makai.
Pasoalum scrobiculatum ...	(None) ...	Kodon.
Panicum psilopodium ...	(None) ...	Kutki.
Pennisetum typhoideum ...	Bulrush millet ...	Bajra.
Fodder crops.		
Sorghum amber ...	Sorghum ..	*Nil.*
,, collier ...	...	
,, sundia	...	
Trifolium alexandrium ...	Berseem ...	*Nil.*
Fibre plants.		
Gossypium neglectum ...	Jari cotton ...	Varadi Kativilayti.
,, indicum ...	Bani ,, ...	Bani
,, hirsutum ...	American cotton ...	Buri.
,, barbadense ...	Eggptian ,, ...	*Nil.*
Crotolaria juncea ..	Bombay hemp ...	San.
Agave (varieties) ...	Aloe ...	Khekti.
Sisalana ...		
Vivipara ..		
Saharanpore ...		
Furcrœa gigantea ...	Mauritius hemp ...	Khekti.
Corchorus capsularis ...	Loy-lying jute ...	Pat.
C. olitorius ...	High-lying ,, ..	
Hibiscus cannabinus ...	Dekkan hemp ...	Ambari, patwa.
Pulses.		
Cicer arietinum ...	Gram ...	Chana.
Caianus indicus ...	Pigeon pea ...	Tur, arhar.
Dolichos lablab ...	Indian bean ...	Val.
,, biflorns ...	Horse gram ...	Kulthi
Pisum arvense ...	Peas ...	Batra, batana.
Lathyrus sativus ..	Chickling vetch ...	Lakh lakori, teora.
Ervum lens ...	Lenti. ...	Masur.
Phaseolus mungo ...	Green gram ...	Mung.
,, radiatus ...	(None) ...	Urad.
Vigna catiang ...	(None) ...	Chauli, barbati.
Oilseeds.		
Linum usitatissium ...	Linseed ...	Alsi, Jawas.
Sesamum indicum ..	Sesamum ...	Til, tilli.
Carthamus tinctorius ...	Safflower ...	Kusum, kharad.
Ricinus communis ...	Castor ...	Andi, arandi.
Brassica juncea ...	Mustard ..	Sarson.
Arachis hypogœa ...	Ground-nut ...	Mung-phalli, bhuimung.
Sugar.		
Saccharum officinarum ...	Sugarcane ...	Santa, us.
	Jaggery ...	Gur.
Vegetables.		
Ipomaea batatas ...	Sweet potato ...	Kand, shakarkand, ratala.
Trapa bispinosa ...	Water chestnut ...	Singhara.
Spices.		
Coriandrum sativum ...	Coriander ...	Dhania.

Botanical, English and Vernacular names of Crops, etc.—(Concld.)

Botanical	English.	Vernacular.
Grasses.		
Saccharum spontaneum	*Nil*	Kans.
Andropogon punctatun	*Nil*	Kunda.
Cynodondacaylon	Couch grass.	Dub.
Weeds.		
Cyperus searious	...	Nagarmotha.
Sesbania aclueata	...	Sawri.
Alysicarpus monilifer	...	Shevra.
Trees.		
Malia azadiracn	...	Nim.
Bassia latifolia	...	Mahus.
Terminalia tomentosa	...	Saj
Silk.	Silk worm	Tassar.
	Castor silk worm	Eri.

Local Agricultural terms—

Bakhar—A kind of blade harrow used as a substitute for the plough and also for preparing the seed bed.

Biasi—The rice seed is sown broadcast and when the seedlings are about 9 inches high, the land is ploughed again at right angles to the direction of the furrows in which the crop was sown, the young seedlings being thus uprooted and thinned.

Lehi—Is the method of sowing broadcast with artificially germinated seed.

Birra—A mixed crop but usually refers specially to the wheat-gram mixture which is the common rabi crop of the northern districts.

Tifan—A drill plough.

Argada—A small weeding plough.

Kharbi—The stalks and leaves of *juar* used as fodder.

Rabi—Crops sown in autumn and reaped at the end of the cold weather.

Kharif—Crops sown at the beginning and reaped at the end of the rains.

Kanhar—Dark clayey loam soil.

Wardi—Light sandy loam soil.

Morand—A soil similar to Kanhar but usually slightly lighter texture.

Utera—A second crop after rice, which is sown in the wet fields among the rice stems.

Kapas—Unginned cotton.

Bojha—A bag of unpressed cotton.

Ghi—Clarified butter.

Bari—A small garden.

Pulla—A bundle, usually of fodder.

Bhusa—Straw and chaff broken up together.

Khedda—An enclosure for the capture of game.

Datari—A log with wooden teeth fixed in it and used as a harrow.

Kopar—A log used for crushing clods.

Bir—An area reserved for the growing of grass.

Govt. Press, Nagpur :—No. 1110, Dir. of Agri.—17-3-15—500.

00133959

Digitized with financial assistance from

Government of Maharashtra

on 01 February, 2020

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